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Physical Performance, Attitudes and Fatness in Young Females

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The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research, for acceptance, a thesis entitled Physical Performance, Attitudes and Fatness in Young Females submitted by JANE LOUISE CAMERON in partial fulfilment of the requirements for the degree of MASTER OF SCIENCE in PHYSICAL EDUCATION.

DEDICATION

To my Mother and Father

who chose me to become a part of their lives.

ABSTRACT

Through this study, the relationships among selected physical performance parameters and attitude toward physical activity of elementary school girls were investigated. A physical fitness performance test, a motor performance test, and a questionnaire assessing attitude toward physical activity were administered to seven, nine, and eleven year old girls of varying levels of fatness. The parents of these children responded to a questionnaire designed to determine parental attitude toward their own and toward their daughter's physical activity participation. These variables were selected for consideration on the basis of their proposed relationship to childhood obesity as implied through a review of related literature.

Relationships between fatness and the variables were determined through analysis of variance and the chi-square statistic with phi and Cramer's V as measures of association. Pearson product-moment correlation coefficients were applied to indicate the strength of the relationships among the interval variables.

Specific physical fitness performance items were found to be inversely related to fatness level and directly related to age level. The children exhibiting a greater proportion of body fat elicited performances significantly lower than those of the girls with average fatness while executing the flexed arm hang, sit ups, and fifty meter run.

The older children performed a greater number of sit ups than the younger children.

Motor performance, as indicated in an item by item analysis, was directly related with the girls' ages. Only the jump and balance (left foot) was found to be inversely related to fatness level.

The results also indicated significant associations between level of fatness and selected attitudinal variables with reference to nine and eleven year old girls. For children seven years of age, however, no significant relationships were found between degree of fatness and the variables under consideration.

When examining the results for girls nine years of age and the three fatness classifications, mother's attitude toward physical activity as long and hard training and father's attitude toward physical activity as a social experience were found to be significantly associated with daughter's fatness. The results accruing when undesirable fat and overfat were amalgamated into above average fat for nine year old girls indicated the following significant associations with daughter's fatness: mother's attitude toward physical activity involving thrill and risk; father's attitude toward physical activity as a social experience; and father's attitude toward daughter's physical activity as a social experience and as long and hard training.

Child's attitude toward two subdimensions of physical activity were found to be significantly associated with the

fatness level of eleven year old girls. These two included the attitudes toward physical activity as both an aesthetic and as a cathartic experience.

Eleven year old girls' level of fatness also was found to be significantly associated with three subdimensions of physical activity reflecting father's attitude toward daughter's participation. These subdomains included physical activity as a social experience, as long and hard training, and for competition.

The present study did not find significant relationships between level of fatness and most of children's attitudes toward physical activity, or the correlates of these attitudes. Due to the limitations of the study, it cannot be stated with assurance that these variables are not associated with fatness. The results of the study did indicate, however, that specific aspects of physical fitness and motor performance were related to the fatness and age classification of the subject. The aforementioned associations between parental attitudes and daughter's fatness also were found to be significant. The conclusions drawn from these results suggested that childhood obesity may be partially addressed through a physical activity program aimed toward improving the physical fitness profile of the overfat child. It was also indicated that parental involvement should be emphasized when designing programs concentrating on physical activity for the prevention and/or treatment of childhood obesity.

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CHAPTER ONE

I. INTRODUCTION

Obesity is a biomedical problem that transcends age, sex, racial and ethnic boundaries. Numerous and varied etiological factors precipitate the onset of obesity. Behavioural, psychological, social and physical factors amalgamate to produce serious physiological and psychosocial consequences. One such associated factor involves the relationship between physical activity and obesity. Physical inactivity, with particular reference to adolescents and children, has been associated with the onset and subsequent progression of the obese state (Lloyd, 1979; Eriksson, 1976; Craddock, 1973; Mayer, 1967; Bullen, et al., 1964; Bruch, 1957).

Childhood onset obesity is of particular importance as it occurs during the child's early physiological and cognitive development. Obesity initiated during these formative periods may predispose the child to the patterning of a lifestyle promoting the progression of obesity. Physical inactivity patterns that are fostered at a young age have the potential to be incorporated into the child's lifestyle as firmly entrenched habits that persist into adulthood (Corbin and Pletcher, 1968).

Since physical inactivity is, at the very least, significant in the onset and progression of childhood obesity, it follows that the prevention and treatment of obesity should address this important factor. One step in

this process may include the assessment of the child's physical fitness, motor performance, and attitude toward physical activity. The development of a healthy attitude toward physical activity may be translated into the patterning of a physical activity level that would assist in the alleviation of the obese condition and promote lifelong physical fitness.

A. STATEMENT OF THE PROBLEM

This study was designed to investigate the relationships of selected physical performance parameters and attitude toward physical activity with elementary school girls of different fatness levels. To this end, two major purposes were outlined: (1) to assess the physical fitness and motor performance of elementary school girls with different fatness levels and to identify specific psychosocial parameters related to their attitude toward physical activity; (2) to study the relationships among these variables in order to assess possible trends related to age and level of fatness.

B. SIGNIFICANCE OF THE STUDY

For the purpose of this study, elementary school age girls of varying degrees of fatness were selected as subjects. These subjects engaged in tests indicative of a multifaceted approach to physical activity, which is known to be associated with the onset and progression of obesity.

Much of the literature reflected the problem of obesity during adolescence and adulthood. Relatively little research had been directed toward elementary school age girls. The literature suggested that obesity was best dealt with through prevention rather than through treatment. Physical inactivity patterns entrenched by adolescence were considered difficult to alter (Dwyer and Mayer, 1973). Therefore, it is important to address obesity during the initial phase of its development or prior to the firm establishment of a lifestyle promoting the obese condition.

Obesity is a multifactoral problem that warrants a multidisciplinary approach to its prevention and treatment. This study investigated one specific factor acknowledged to be associated with the etiology and treatment of obesity. The association between physical activity and childhood obesity was viewed from the perspectives of physical fitness, motor performance, and attitude toward physical activity. These components were then examined to discover any relationships with the child's level of fatness.

C. VARIABLES INCLUDED IN THE STUDY

Obesity

Obesity refers to an excess of body fat as related to the lean body mass (Fomon and Ziegler, 1977; Craig, 1969). The term "excess" may be defined through an arbitrary division of fatness levels indicating the degree of difference from the median of the population (LeBlanc and

Weil, 1980). Another study utilized the sum of skinfold measurements from the triceps, biceps, subscapular, and suprailiac sites to describe levels of fatness (Quinney and Conger, 1981). Values in the 40th to 60th percentile indicated average fatness; those in the 20th to 35th percentile corresponded to undesirable fatness; and those at the 15th percentile or below were classified as overfat (Quinney and Conger, 1981). In the present study, these three categories were extended at both ends of the percentile ranges. Average fatness was defined in the 37.5 to 62.5 percentile range. Undesirable fatness was indicated in the 17.5 to 37.5 percentile range. The overfat classification coincided with the percentile range of 17.5 and below. Seltzer and Mayer (1965) utilized a triceps skinfold measurement and classified 15 percent of the children as obese.

Physical Activity

Obesity and physical activity have been related in an associative rather than a direct causal manner in the etiology of obesity. Obese girls usually spend more time involved in sedentary activity than nonobese girls (Bullen, et al., 1963). When actively engaged in physical activity, obese children have been found to spend a greater proportion of this time standing still and less time vigorously active than nonobese children (Corbin and Pletcher, 1968; Bullen, et al., 1963).

For the purpose of this study, physical activity was defined in a general manner referring to physical pursuits encompassing varied degrees of organization. These included play, games and sport, as well as physical education classes.

Physical Fitness

The physiological adaptations to obesity are reflected through their effect on normal daily functioning of the individual. Obesity has been associated with a decreased physical working capacity (Chlouverakis and Klöcke, 1975). The stress of the additional weight of the excess fat may promote structural damage to the weight-bearing joints (Van Itallie, 1979; James, 1976; Craddock, 1973, Hoffman,1957).

This study examined six components of physical fitness performance in order to determine the relationship between level of fatness and physical fitness of elementary school age girls. The following were the selected components as outlined by the C.A.H.P.E.R. Fitness Performance Test II (Gauthier, et al., 1980): upper body strength, lower body power, agility and speed, abdominal power, anaerobic capacity, and aerobic capactiy.

Motor Performance

Childhood obesity and its effect on motor performance have received infrequent consideration in the literature. The physical and psychosocial stresses affecting physical fitness performance may also negatively effect motor performance. Obese children have been found to have

difficulty executing some motor performance tasks that are usually successfully completed by nonobese children who are free of motor impairment. Excessive weight disproportionately distributed may hamper the performance of balancing tasks.

This finding is congruent with the common belief that obese children are clumsy. Clumsiness is the term usually assigned to children whose level of competence in motor skills is significantly below the norm but where there is no evidence of disease of the nervous system (Henderson and Hall, 1981).

When clumsy movements are combined with the socially undesirable appearance of obesity, the obese individual may be subjected to the taunts and jeers of their peer group. This negative peer pressure may inhibit the obese child from participating in activities that highlight their clumsiness. Consequently, the obese child may engage in fewer practice sessions that would normally improve the child's motor performance level (Wall, 1981). A vicious cycle ensues whereby the child falls further and further behind in motor skill during a time when she should be greatly increasing the number and quality of movement skills.

Three indices of motor performance were examined in this study. These included the following, as outlined by Taylor's (1981) modification of the Stott Test for Motor Impairment: balance of the body while immobile, control and coordination of the upper limbs, and control and

coordination of the body while in motion.

Child's Attitude Toward Physical Activity

Middle childhood is the time during which the individual increasingly acquires and organizes information, and develops basic attitudes (Simon and Smoll, 1974). Children indicating either a favorable or a negative predisposition toward physical activity may benefit from exposure to an environment fostering a positive behavioral disposition toward physical activity. Such an environment may prevent the establishment of the physical inactivity patterns associated with the onset and progression of obesity during childhood and adolescence.

This variable took into account the behavioural disposition reflecting both direction and intensity of feeling of the individual toward sports or physical activities requiring vigorous bodily movement (Butcher, 1980; Kenyon, 1968). Specifically, this study investigated the attitude of the child toward six subdomains as outlined by Kenyon (1968) and modified by Simon and Smoll (1974). These included viewing physical activity from the following frames of reference: as a social experience, for health and fitness, as a thrill but involving risk, as the beauty in human movement, for the release of tension, and as long and hard training. A seventh subdomain, as outlined by Butcher (1980), was incorporated to ascertain the child's attitude toward physical activity for competition.

Correlates of Attitude Toward Physical Activity

Attitudes and resulting behaviour are the products of socialization (Loy and Ingham, 1973). Two significant components of the socialization of children into physcial activity have been proposed by Kenyon and McPherson (1973). These include personal attributes and socializing agents. Personal attributes refer to the prevailing disposition the individual brings to the situation. In this study, body satisfaction and movement satisfaction were the personal attributes investigated. Socializing agents respond to the individual on the basis of their own expectations. The interaction of personal attributes and socializing agents produces modifications whereby the individual assimilates attitudes and behaviours congruent with what society expects.

During early childhood, parents are often the principal agents of socialization. The direction of parental influence, with respect to physical activity participation, is often dependent upon the child's sex. Girls frequently receive less encouragement to participate in sport and other forms of physical activity than do boys. This occurrence was not examined within the present study, but it should be acknowledged when attempting to account for the differences in parental attitudes toward children's physical activity participation. The following aspects of parental influence were considered worthy of attention in the investigation of a child's attitude toward physical activity: parents'

attitude toward physical activity, parents' attitude toward their daughter's physical activity, and parental encouragement to participate in physical activity.

Personal Attributes

Body Cathexis. The degree of feeling of satisfaction or dissatisfaction with various parts or processes of the body is called body cathexis (Darden, 1972; Secord and Jourard, 1953). An individual's attitude toward their own body is an important aspect of self concept (Caskey and Felker, 1971). The pressure of society's prevalent negative attitude toward obesity, as partly reflected through mass media advertisements, engenders within the child a feeling that their body is loathesome and grotesque (Allon, 1973; Craddock, 1973; Monello and Mayer, 1963). Consequently, it may be expected that obese children would exhibit a low degree of body satisfaction.

Movement Satisfaction. This factor is reflected through the level of satisfaction or dissatisfaction with an individual's ability to move in various situations (Butcher, 1980). Obesity sets an environment in which the weight-bearing joints come under considerable pressure, thus subjecting them to damage (Van Itallie, 1979; James, 1976; Craddock, 1973; Hoffman, 1957). Genus valgum (knock-knees) and pes planus (flat feet) are examples of such structural defects that may hinder efficient and graceful body movement.

The obese child may refrain from taking part or actually be excluded from participation in physical activity as a result of negative peer pressure. Consequently, the child may be denied the opportunity to engage in activity whereby their movement ability would benefit from practice. Therefore, it is likely that movement satisfaction would not be characteristic of obese children.

Socializing Agents

Parents' Attitude Toward Physical Activity. Children are initially introduced to sport and physical activity if their parents are interested in such activities (Snyder and Spreitzer, 1978). Bullen, et al. (1963) found that there was no significant difference between the physical activity levels of the parents of obese and non-obese female adolescents. Further investigation is warranted to determine whether or not parents' attitude toward physical activity is related to daughter's fatness level during childhood and preadolescence.

Parents' Attitude Toward Child's Physical Activity. Because of the significant role that parents play in the socialization of children into sport and physical activity, one might assume that parental attitude toward their daughter's physical activity participation would be a factor affecting the child's actual participation and attitude. Johnson, et al. (1956) did not find this to be the case for one aspect of physical activity when fatness level was evaluated. They found no significant difference between the

parents of obese girls and the parents of non-obese girls with respect to their attitude toward strenuous physical activity for their daughters. This component and other subdomains of physical activity were investigated through this study.

Child's Perception of Parental Encouragement. Parental encouragement of children to participate in sport and physical activity has been a significant factor in the child's participation in physical activity (Butcher, 1980; Snyder and Spreitzer, 1978; Snyder and Spreitzer, 1976; Bullen, et al., 1963). The child's perception of this occurrence would likely play a role in the child's attitude toward and participation in physical activity.

D. RESEARCH QUESTIONS

This study considered three research questions.

1. Are there any relationships among the variables at each age and fatness level?

2. If any relationships exist, are they statistically significant?

3. If any significant relationships exist, are they of theoretical and practical significance?

E. DELIMITATIONS

Elementary school girls aged seven, nine and eleven years were selected from the Edmonton Public School System to be utilzed as subjects for this study. Parents of these

selected children were contacted and became a part of the data collection process. Parental influence on the child's attitude toward physical activity was examined through a questionnaire. The selected variables were identified on the basis of their established or intuitively proposed relationship to childhood obesity and physical activity. Once collected, the data were analyzed utilizing methods suitable to address the research questions. These basic research questions were examined within the context of the variables and their relationship to the subject age and fatness classifications.

F. LIMITATIONS

It was acknowledged that there may be several factors, concomitant with physical inactivity, involved in the etiology of obesity. This study attempted to focus on the physical inactivity factor because of its primary significance in the onset and progression of childhood obesity.

Whenever a questionnaire method is utilized, the truthfulness of the answers comes under question. The questionnaire was designed for the level of comprehension of seven year old children. Explanations and supervision were imposed with the intention of minimizing the inherent limitation of the questionnaire method.

A limitation pertaining to the method by which the data were obtained involved the tester's level of experience of

working with young girls. Prior to data collection, steps were taken through a pilot study to minimize this limitation. This procedure involved a conversation with seven and nine year old children at one of the participating elementary schools, and the administration of a tentative questionnaire assessing their attitude toward physical activity.

Another limitation of the study revolved around subject permission for study participation. Not all of the children and parents identified as study candidates were involved in this investigation. When the children and parents participated in the study, there was no guarantee that the subjects would partake in all aspects of the investigation. The parents did not always complete the total questionnaire and the students were sometimes unavailable for testing on the specified test administration dates. Provisions were made to test as many of the absentee subjects as possible during subsequent testing sessions.

CHAPTER TWO

II. REVIEW OF RELATED LITERATURE

The relationships between physical fitness, motor performance, attitude toward physical activity and correlates of this attitude with fatness level were investigated in elementary school girls. The selection of these variables was based upon the results of previous research conducted in the area of physical fitness performance, motor performance, and psychosocial factors relevant to childhood obesity.

A. ETIOLOGY OF CHILDHOOD OBESITY

Obesity can be the result of several etiological factors acting singularly or in concert. Childhood obesity and these factors are seldom directly causal and are more often indirectly associated with the condition. For example, there would appear to be a relationship between the incidence of childhood obesity and parental obesity. If one parent is obese, there exists a 40% chance that the child will be obese; and if both parents are obese, the likelihood of the child also being obese increases to 70% to 80% (Briggs and Calloway, 1979).

In studying matched pairs of obese and nonobese high school girls, Johnson, et al. (1956) observed that 33% of the fathers and 42% of the mothers of obese girls were also obese. On the other hand, only 21% of the fathers and 7% of the mothers of the nonobese girls were considered to be

obese.

Bullen, et al. (1963), while studying obese and nonobese adolescent girls, found that in the obese group, 44% of the fathers were considered obese while 11% of the fathers of the nonobese girls were obese. Although obesity was defined as being 20% above the ideal weight for height according to the New York Metropolitan Life Insurance Standards, these findings are indicative of a trend illustrating the incidence of overweight parents with overweight children.

This trend was further supported when Bullen, et al. (1964) found that 58% of the fathers and 41% of the mothers of obese adolescent girls were obese. Only 8% of the fathers and 6% of the mothers of the nonobese group were considered obese. It has been suggested that not only may there exist a genetic predisposition toward the onset of childhood obesity, but also familial food and physical activity patterns may be significant etiological contributors to childhood obesity (Johnson, et al., 1956).

The relative importance of overnutrition and physical inactivity patterns in the onset of obesity varies. The literature, however, supports the notion that physical inactivity is an important and an even more predominant factor in the etiology of childhood obesity than is overnutrition (Craddock, 1973; Young, 1973; Seltzer and Mayer, 1970).

Johnson, et al. (1956) compared the caloric intake and physical activity in paired groups of obese and nonobese high school girls. A dietary history was utilized to determine the caloric intake of the individuals. Information pertaining to the subjects' physical activity pattern was gained through an interview. The type of activity, the weekly average hours of participation, and the resulting caloric expenditure above the basal metabolic rate defined the activity index. Due to the limitations of this method, the results were looked upon as being ordinal rather than interval in nature. The results unexpectedly indicated that the average caloric intake of the obese girls was lower than that of nonobese girls. This finding is contrary to the common belief that obese children eat significantly more than nonobese children. Both groups were considered sedentary, but the obese participated in fewer active sports and other strenuous activities.

Through a questionnaire evaluation, Bullen, et al. (1963) noted that obese adolescent girls were more concerned about the relationship between their food intake and their weight, than about their reported sedentary lifestyle. These girls admitted to spending more time involved in sedentary activity than did the nonobese girls, yet they emphasized the role of diet for the control of their weight.

Bullen, et al. (1964) appraised the physical activity of obese and nonobese adolescent girls. The girls were filmed while swimming, playing volleyball and playing

tennis. The average number of subjects per picture for each locomotor caloric category was determined. The nonobese girls were found to be more active than the obese girls. Not only were the obese girls active less frequently, they also managed to be relatively sedentary while engaged in active sports. Whether or not this occurrence was directly related with fatness level or indirectly associated with a lack of personal satisfaction while engaged in physical movement was not investigated.

In another film analysis study, Corbin and Pletcher (1968) investigated the dietary and physical activity patterns of fifth grade children with varying levels of fatness. These children were filmed in three activity situations including unorganized play, low organized play, and organized play. The activity index was based upon the energy cost of and the time involved in each performance. The parents' and child's response to a dietary recall questionnnaire was used to determine the weekly caloric intake. Correlations between skinfold measurements and caloric intake, and skinfold measurements and activity, were investigated. There were no significant differences between the groups with reference to the total and type of calories consumed. However, obese subjects were active a lesser percentage of the time than the nonobese in all activities.

Saris, et al. (1980) investigated the relationship between working performance, daily physical activity, fatness and nutrition in school children aged four through

six years and eight through twelve years. For the younger children, there was a significant difference between the number of calories consumed by those in the lowest and highest quartile ranking on physical performance capacity. The older children did not differ on the amount consumed, but there was a significant difference between the lowest and highest physical performance capacity quartiles as to the amount of fat consumed. The low ranking group consumed less fat and less cholesterol than those with the highest physical performance capacity. There was no significant difference between the blood lipid level of these two groups. The teachers rated the low group as significantly less physically active during selected school activities. The lowest quartile group also posessed significantly higher body weights and skinfold thicknesses than those in the highest quartile ranking on physical performance capacity.

B. THE STRESS OF OBESITY

The condition of excess body fat in children is primarily significant in three general respects. Physiological adaptations to obesity, i.e., decreased physical work capacity and structural abnormalities, are potentially harmful to the physical health and functioning of the individual. These physical consequences of obesity may inflict psychosocial stress on the individual through the conflict between the obese child and the immediate societal attitude toward obesity.

Obesity in childhood is further significant in the likelihood of obese children becoming obese adolescents and adults. Approximately 80% of obese children, and specifically obese girls, become obese adults (Coates and Thoresen, 1978; Fomon and Zeigler, 1977; Lloyd, 1969). This persistence of the obese state indicates the length of time during which the physical and psychosocial problems fester and potentially inflict lasting physiological and psychological damage.

Physical Adaptations

Adipose tissue consists of neutral storage fat (triglycerides) and essential lipids (phospholipids and sphingomyelins) (Schemmel, 1980). The essential lipids are located in the brain, bone marrow and spinal cord. The triglycerides are stored in the intraabdominal, intramuscular, and subcutaneous depots. Approximately half of the total body fat is stored subcutaneously, with its distribution more abundant on the arms, as opposed to the abdominal region, of children (Mayer, 1959).

The composition of these fat cells, under normal conditions, is 80 to 85% fat, 10% water, and 2% protein (Craddock, 1973). Under obese conditions, however, there is a slight increase in the proportion of fat. Obese children often have been found to have hypertrophied adipocytes that are the size of normal adult fat cells, whereas those of nonobese children are smaller than adult size (Knittle, 1973). Childhood-onset obesity, prior to thirteen years of

age is often associated with hypercellularity as well as hypertrophy of the adipose tissue (Knittle, 1973).

The functions of adipose tissue consist of the assimilation of carbohydrates and lipids for fat synthesis and storage, as well as the mobilization of lipids as free fatty acids (Craddock, 1973). In the obese state, however, both carbohydrate and fat metabolism are impaired.

An increased carbohydrate intake is associated with active or developing obesity (Craddock, 1973). This condition requires a more efficient and rapid removal of carbohydrate from the blood. Hyperinsulemia, often found in the obese, is the adaptation to this necessity (Coates and Thoresen, 1978; Pawan, 1969). The insulin has a stimulating effect on fat synthesis which, in turn, leads to a rapid accumulation of fat stores. The increased glucose load and resulting increased plasma insulin level may produce hypoglycemia (Craddock, 1973). The glucose uptake by the muscles is decreased in the obese, and there is an associated low rate of oxidation of glucose. The net result is a diversion of the ingested carbohydrate to the adipose tissue.

Fat metabolism is effected in impaired fat mobilization (Craddock, 1973; Pawan, 1969). In the obese, a low level of circulating growth hormone is sometimes found. Growth hormone exerts a fat mobilizing and anti-lipogenic effect on the adipose tissue. The lipolytic hormones, adrenaline and noradrenaline, are less effective in initiating lipolysis

and elevating the free fatty acid levels in the blood.

Other metabolic adaptations may include adrenocortical hyperactivity, depressed thyroid function, and a significantly reduced renal blood flow and glomerular filtration (Craddock, 1973). The latter, combined with high levels of anti-diuretic hormone in the plasma, produces fluid retention. This, in turn, is associated with the development of hypertension.

The association between obesity and hypertension, and then hypertension and cardiovascular disease, is one example of the indirect mechanism through which obesity is associated with serious health problems (LeBlanc and Weil, 1980; Allon, 1973). Similar indirect pathways link obesity with diabetes mellitus, gallbladder disease, renal disease, and liver ailments (Van Itallie, 1979).

Another example includes the atherogenic metabolic alterations associated with obesity (Grommet, 1980; Kammel and Gordon, 1975). Atherosclerotic deposits reduce the elasticity of the arteries. In women, this condition of increased blood pressure, when combined with an elevated diaphragm, decreased lung volume and a change in the heart position that result from obesity, produces an environment promoting the development of congestive heart failure (Bine, 1979).

As well as increased blood pressure, an increased stroke volume may also be found in obese individuals. These two amalgamate to produce an abnormal stress on the

myocardium (Grommet,1980; James, 1976; Chlouverakis and Klocke, 1975; Buskirk, 1969). The obese individual also exhibits an increased pulse rate at the same oxygen uptake level as non-obese individuals. This is indicative of a decreased aerobic capacity when examined on a per kilogram basis. The obese state exerts a burden on the heart which exceeds the metabolic activity of the adipose tissue (Chlouverakis and Klocke, 1975).

Another type of stress imposed by obesity is that associated with respiration (Bine, 1979; James, 1976; Wilson and Wilson, 1969). In obese adults, inspiration and expiration are affected because of the elevated diaphragm and the extra effort necessary to compress an already swollen abdomen.

Chaussain, et al. (1976) evaluated various respiratory parameters of obese and nonobese children. The only measurement to fall outside of the normal range was the ventilatory response to carbon dioxide inhalation. This measurement evaluates the responsiveness of the respiratory centres and effectors of the thoracic response. The response was signficantly reduced in obese children and there existed a highly significant negative correlation between the response and the degree of weight excess. The authors suggested that the reduced response to carbon dioxide inhalation was related to the thickness of the chest wall and abdominal girth, rather than being caused by hyposensitivity of the respiratory centres. It was concluded

that the effects of overweight on respiration begin in childhood and that the response to carbon dioxide inhalation is the first parameter effected.

Other structural problems associated with obesity, particularly childhood obesity, include damage to the weight-bearing joints of moderately to severely obese individuals (Van Itallie, 1979; James, 1976; Craddock, 1973; Hoffman, 1957). Genu valgum, pes planus, coxa vera, slipped femoral epiphysis, osteoarthritis, and poor posture are examples of the structural stress of obesity in children.

Psychosocial Stress

With reference to the physical stress associated with obesity, "as significant as the morbidity, morality, and functional deficiency correlates of obesity are, the psychological and social effects of obesity are frequently those that are perceived as being most disabling by the obese" (LeBlanc and Weil, 1980:103).

Psychological stress exists when the inner environment (life experience and upbringing) conflicts with the outer environment (culture and society) in terms of expectations (Berblinger, 1969). One need only watch television and look through magazines to ascertain that the thin physique is to be venerated. Obese individuals do not conform to this prevalent societal attitude and, as such, are often ostracized. The stigma attached to obesity is reflected through the rejection and disgrace associated with a condition perceived by society as both a physical deformity

and a character flaw (Allon, 1973). Obesity is often viewed as being indicative of poor self control (Hirsch, 1973). The obese child is subject to this type of pressure from their peers (Monello and Mayer, 1963). The obese child then turns to the family group for acceptance (Bullen, et al., 1963). The obese condition, however, often becomes a source of constant tension between the child and the family (Dwyer and Mayer, 1973; Mayer, 1967). The consequence for the child is the lack of an "in group" with which to associate.

In particular, obese girls are imposed upon by these types of pressures (Mayer, 1967). These girls become hypersensitive and highly vulnerable to the prevalent societal attitude toward obesity (Bruch, 1973; Berblinger, 1969; Monello and Mayer, 1963; Bruch, 1957). They, too, begin to view their bodies as loathesome and grotesque (Craddock, 1973).

As social outcasts, obese adolescent girls have been found to exhibit characteristics associated with other minority groups. Monello and Mayer (1963) investigated obese and non-obese girls' responses to a word association test, sentence completion test, and various pictures of groupings of people. The overweight girls responded to the word association test with references to weight more often than did the non-obese girls. Passive or responses indicating lack of initiative were characteristic of the responses of the obese girls to the sentence completion tests. By attending a special summer camp aimed at weight reduction,

it was apparent that the obese girls tended to adopt the dominant group's (society's) attitude toward obesity. They, like some members of racial and ethnic minorities, i.e., Jewish people changing their names, attempted to alter their distinctive (obese) traits by attending the camp.

This discrimination provides the basis for the initiation of a self-fulfilling prophecy (Allon, 1973). Once discriminated against, the obese individual begins to believe that this discrimination is justly deserved. The obese person then comes to judge himself/herself upon the dominant values and expectations of society. These individuals may perceive their bodies as grotesque manifestations of their lack of self control.

C. TREATMENT OF CHILDHOOD OBESITY

The immediate goal of the treatment of childhood obesity is a reduction in the total body fat content of the individual (Dwyer and Mayer, 1973). Often the focus of this treatment has been directed toward the diet of the child. However, a severe caloric restriction in childhood may result in a negative nitrogen balance and diminished growth can occur. Considering physical inactivity's primary role in the onset and progression of childhood obesity, the importance of including physical activity in the treatment regimen is emphasized.

The need for childhood physical activity is illustrated through the many physiological and psychological benefits

that are attributable to physical activity participation (Bailey, 1976; Cumming, 1976). These benefits affect childhood and may also prove to be of lasting benefit through adolescence and into adulthood.

Physical activity would seem to be necessary for normal growth and for stressing the functional capacity of the cardiorespiratory system, bones, ligaments, and muscles. Exercise also may lead to a reduction in body fat and, consequently, a more desirable lean body mass to adipose tissue ratio (Horton, 1973; Lutwak and Coulston, 1973; Larsson, 1967).

Altering the diet of the child, on the other hand, has not been shown to enhance the efficiency of muscular activity or increase the total fitness level of the individual (Lutwak and Coulston, 1973; Bloom, 1968). Physical activity and caloric restriction applied in concert may prove to be more beneficial than either mode alone (Horton, 1973; Lutwak and Coulston, 1973; Buskirk, 1969; Yudkin, 1969).

The psychosocial disposition of the child may also be enhanced through the utilization of physical activity as intervention in the progression of obesity. Mental health may benefit from a cathartic use of physical activity (Cumming, 1976). Physical fitness has been associated with improvement in self satisfaction and acceptance, adequacy in social interaction, and an increase in the self esteem and confidence of obese individuals (Horton, 1973).

In addressing the problem of childhood obesity, the acknowledgement of the significant role of physical inactivity in the development of obesity is of paramount importance. It naturally follows that the treatment of the obese condition should reflect the importance of this etiological factor. In order to determine the nature of this physical activity intervention, components of physical activity participation require examination to ascertain their status during the obese state. The intuitive integration of physical fitness performance, motor performance, and child's attitude toward physical activity with its correlates were examined through this study.

D. PHYSICAL FITNESS PERFORMANCE

Obese children have been found to be significantly less physically active than their nonobese counterparts. This lack of involvement in activities that benefit physical fitness would imply a lower level of physical fitness performance for the obese than for those involved in physical activity. The literature provides evidence supporting this notion that increased relative levels of body fat negatively affect physical fitness performance.

Saris, et al. (1980) examined the relationship between physical performance capacity and body composition of children aged four through six years and eight through twelve years. The physical performance capacity was determined through a PWC 170 test. From this evaluation, the

two age groups were divided into three subgroups of physical performance capacity representing the upper quartile, the middle two quartiles, and the lowest quartile. Those in the lowest quartile were significantly heavier and posessed higher skinfold measurements than those in the highest quartile ranking of physical performance capacity.

Elementary school boys were utilized in the investigation by Brookwalter (1952) who studied the relationship of physique, developmental level, and physical fitness. The Wetzel grid was the method by which the physique and developmental levels of the subjects were determined. The physical fitness performance test consisted of straddle jumps, push ups, squat thrusts, and a vertical jump. The author found that body size and shape influenced physical performance scores. There was found to be a consistent increase in the physical fitness scores as the developmental level increased. Large, fat boys tended to vary more in their physical performance measures than normal, thin boys. The very obese boys were found to be the poorest physical performers.

Cureton, et al. (1975) investigated the relationship between body composition and physical fitness performance of eight to eleven year old boys. The fitness test consisted of pull ups, sit ups, shuttle run, standing broad jump, a 50 yard and a 600 yard dash, and a softball throw for distance. Body composition included a measurement of body density through hydrostatic weighing, skinfold measurements, and

body potassium. Body density was positively related to all types of performance with the highest correlations occurring with pull ups and the two dashes. The lean body mass was significantly correlated with the softball throw and the broad jump. The skinfold measurements were negatively correlated with all of the physical fitness performance items, the highest correlations on the 600 yard dash and the pull ups.

Slaughter, et al. (1977) conducted a study to determine the association of somatotype, body composition and physical performance of seven to twelve year old boys. Somatotypes were estimated utilizing Sheldon's Trunk Index Method and Heath-Carter's Anthropometric method. Body composition consisted of measurements to estimate lean body mass and body fat. The physical performance test consisted of a one mile run, a 600 yard and a 50 yard dash, standing broad jump and a vertical jump. It was found that body fat was negatively correlated with running and jumping and that endomorphy was negatively correlated with jumping.

Espenschade (1963) investigated the relationships of age, height and weight to the performance of adolescent boys and girls on a physical fitness test. A low negative relationship was found between weight and the performance in a dash and the standing broad jump.

Overweight, average weight and underweight adolescents were involved in Hendry and Gillies' (1978) study of body type, body esteem, school and leisure. Overweight and

underweight was defined as plus or minus 1.5 standard deviations from the ponderal index mean. A 600 yard run was the measurement of physical fitness. The overweight adolescents were found to be the most unfit group on the basis of this fitness criterion.

E. MOTOR PERFORMANCE

Although it would appear that obesity negatively affects the physiological functioning of the individual, the degree to which the same condition affects motor performance is less clearly defined. Due to the symbiotic nature of the relationship between physiological functioning and motor performance, the negative physical effects of obesity may, in turn, hinder motor performance. For example, flexibility is limited by tissue to tissue approximation. This component of physical fitness may be restricted in obese individuals where the tissue to tissue approximation would occur through a lesser range of motion than would occur in nonobese individuals. This may result in an abnormal movement pattern in activities requiring the use of the full normal range of motion.

Even though it negatively affects physical fitness and may affect motor performance, obesity is seldom considered as a physically handicapping condition (Wheeler and Hooley, 1976). For the purpose of this study, motor performance was viewed within the context of some degree of motor impairment or handicap as reflected by clumsiness. Clumsiness refers to

a level of competence in motor skills that is significantly below the norm, but where there is no evidence of disease of the nervous system (Henderson and Hall, 1981). A more specific definition would refer to children without known neuromuscular problems who fail to perform culturally normative motor skills with acceptable proficiency (Wall, 1981).

Balance, the ability to maintain a body position against gravity or other external forces, may be negatively effected by obesity. The proportion of body segments to one another should be considered when referring to balance (Arnheim and Sinclair, 1975). Obese individuals possess abnormal amounts of body fat that may be disproportionately distributed which, in turn, may affect balance performance.

Gutezeit (1976) examined the fine and gross motor behavior of obese children. The children were evaluated on their performance on fine and gross motor tasks, prior to and upon cessation of a four week hospitalized diet program. The performance of the gross motor tasks, jumping sideways and shifting boxes, were significantly improved after the weight reduction period. Consequently, the author attributed restriction in mobility, as evidenced at the pre-program evaluation, to be due to excessive weight. The improved performance of the obese group did not equal the performance of the control group, but the higher demands of keeping tempo and balance, as required by the tasks, could not be gained after only four weeks.

Henderson and Stott (1977) compiled a battery of tests to measure minor failures of coordination reflecting the motor effector, i.e. muscular movement, of dysfunction in the neural structures governing behavior and learning. The criteria for selection of items included practicality of measurement in a school setting, and minimizing perceptual, cognitive, and emotional factors so that the focus would be on motor function. The point of failure represented a level of impairment that would handicap the child in normal daily tasks. The battery of items was not intended to measure motor ability as a dimension, however it outlined tasks which should be successfully performed by children free of motor impairment. It was revealed that obese individuals had difficulty performing the jump-and-balance-on-one -foot item. The failure in these cases was attributed to excessive weight, which handicaps jumping and landing with all the body's weight on one foot, rather than being caused by a neurologically based dysfunction.

Proficiency in physical activity is considered an important aspect of the social and emotional development of children (Wall, 1981). Physical ability has been shown to exert a positive influence on the social acceptance of the child (Cratty, 1975). Consequently, a child lacking acceptable proficiency in motor skills, as may be illustrated by the performance of the obese children on Henderson and Stott's (1977) test, becomes a target for social rejection. Clumsiness engenders social hostility

(Cratty, 1975). This social rejection may be illustrated through voluntary or involuntary exclusion of the child from physical activity participation with peers.

Keogh (1977) suggested that the development of motor skill proficiency is related to movement consistency followed by movement constancy. Movement consistency involves the "development of movement skills that are characterized by the efficient patterning and ordering of movement to solve everyday living problems in an appropriate and reliable way" (Keogh, 1977:80). Movement constancy refers to "the flexible use of movement consistencies in a variety of movement situations" (Keogh, 1977:80). Consistency in a movement skill probably has to exist prior to the utilization of the skill in a variety of movement situations.

Movement consistency is dependent upon the number and quality of trials achieved while engaged in a practice session (Wall, 1981). Without this practice during childhood, because of the possible exclusion of obese children from physical activity participation, movement consistency and movement constancy may remain underdeveloped at a time when the spatial and temporal demands of age appropriate movement skills increase exponentially (Wall, 1981). A vicious cycle ensues whereby these children may lack proficiency in motor skills and may be denied the opportunity of improving them.

F. CHILD'S ATTITUDE TOWARD PHYSICAL ACTIVITY

In the literature, attitude toward physical activity and its relationship to primary involvement in physical activity and to physical fitness has not been clearly established. The intuitively implied relationship of a positive attitude leading to participation in physical activity, and consequently to physical fitness, has not been consistently supported, particularly with respect to the obese population.

In the Bullen, et al. (1963) investigation of obese and nonobese adolescent girls' attitudes toward physical activity, it was found that obese girls rated themselves as average or less active than did nonobese girls. When addressed with direct statements about physical activity, the obese group responded in a positive manner; they answered favourably when asked if they liked to participate in specific physical activities. When directed an ambiguous question that may have elicited a physical activity associated response, the obese group tended not to respond spontaneously with activity-oriented ideas.

Bullen, et al. (1964) appraised the physical activity of obese and nonobese adolescent girls. Part of this study included a questionnaire designed to reveal the girls' perceptions of their behavior and feelings toward physical activity. These girls projected a relatively sedentary lifestyle, with the obese group being the most sedentary, even when involved in physical activity. Through the

questionnaire, it was revealed that the obese girls responded with favorable attitudes toward physical activity and participated for social reasons, rather than for weight control. These girls thought that their weight was a major factor preventing participation in physical activity. Swimming was disliked by the obese girls. On the surface, this attitude would appear to be contrary to the expected result of a favourable attitude toward an activity that, more than most, assists in the negation of the overfat problem. The bouyancy achieved by obese children in water may often prove to be more of an asset than the liability produced by excessive fat in activities requiring the support of the body weight on land. If one delves a little deeper, however, this negative attitude toward swimming may be justified for aesthetic reasons. The attitude may be attributed to the child's perception of her appearance in swimming attire rather than to the actual activity. Swimming costumes, more than gym strip or other clothes, reveal a great proportion of the body. If the obese child perceives obestiy as a problem, it is highly likely that she would reject participation in an activity that necessitated the wearing of apparel designed to reveal the body, even though the child may not be physically handicapped during the actual swimming activity.

Kenyon (1968) designed a method for the assessment of attitude toward six subdomains of physical activity. Simon and Smoll (1974) modified the questionnaire to facilitate

comprehension by grades three through six school children. A semantic differential response technique was utilized to gauge the direction and strength of the attitude toward the six subdomains. Physical activity was described within the following contexts: as a social experience, for health and fitness, for thrill and risk, for the beauty in human movement, for the release of tension, and as long and hard training.

Butcher's (1980) assessment of the physical activity participation of adolescent girls also utilized Simon and Smoll's (1974) inventory. For the purpose of Butcher's study, a seventh subdomain, physical activity for competition, was added. Child's attitude toward physical activity as long and hard training and for competition were found to be positively related to participation in physical activity.

Smoll, et al. (1976) examined the relationships among children's attitude, involvement, and proficiency in physical activities. It was thought that proficiency in physical activity would be an important factor associated with a child's attitude toward physical activity. A questionnaire was administered to boys and girls in grades four through six. This questionnaire was directed toward the determination of degree of primary involvement, frequency of participation, and attitudes toward the same six subdimensions of physical activity. Proficiency in physical performance was evaluated through the following tests: a 50

yard dash, standing broad jump, and a softball throw for distance. Utilizing canonical correlation analysis, the nature and degree of the relationship among paired sets of variables (paired combinations of attitude, involvement, and performance) were determined. It was revealed that children were primarily involved in physical activities for which they held the most positive attitudes, thus indicating a highly significant relationship between attitude and involvement. There was found to be no significant relationship between proficiency of performance in physical activity and attitude.

Eleventh grade girls were utilized as subjects to assess the relationship between physical fitness and attitude toward physical education (Young, 1970). The A.A.H.P.E.R. Youth Fitness Test (1965) was the method by which fitness performance was evaluated and the Wear Inventory (1951) was employed to determine attitude toward physical education. A significant positive correlation was found to exist between physical fitness and attitude toward physical education, regardless of the socioeconomic background of the subjects.

G. CORRELATES OF CHILD'S ATTITUDE TOWARD PHYSICAL ACTIVITY

Kenyon and McPherson (1973) proposed a conceptual model representing socialization into sport. Two of the three components of this model were personal attributes and socializing agents. For the purpose of this study, personal

attributes were reflected through body cathexis and movement satisfaction. The agents of socialization referred to components of parental influence.

Personal Attributes

Body image refers to "all measureable responses the child makes relative to his [her] body's size, shape, components, perceived capacities for movement, and interactions with environment" (Cratty, 1970:103). The degree of feeling of satisfaction or dissatisfaction with the various parts and processes of the body is referred to as body cathexis and is a part of the individual's body image (Secord and Jourard, 1953). These authors designed an instrument for the measurement of this factor. They found that the body and self of college men and women were cathected to the same degree. Weinberg (1960) replicated Secord and Jourard's (1953) study and the findings supported the origninal authors' results that body cathexis and self concept were significantly positively related.

Rosen and Ross (1968) attempted to refine Secord and Jourard's (1953) body cathexis instrument by allowing the subjects to indicate the perceived importance of the body part or process under consideration. The subjects were asked to indicate the degree of satisfaction and the degree of importance of the body part or process. Body cathexis was found to be a function of the importance of the body part.

Guyot, et al. (1981) examined the physical fitness, sports participation, body build and self concept of

elementary school children in grades four through six. The students were classified according to their performance on a physical fitness test, and grouped above the 70th percentile and below the 50th percentile on these measurements. Body composition, as estimated by a ponderal index score, was significantly related with physical fitness, physical appearance satisfaction and total self concept. Physical fitness was not related to sport participation. Total self concept was significantly related to sport participation, physical fitness, and physical appearance satisfaction.

Overweight, average weight, and underweight adolescents were investigated as to their social relations, sport and leisure involvement and body esteem (Hendry and Gillies, 1978). The average weight group perceived themselves as being more physically skilled and having more enthusiasm for sport than did the overweight group. The overweight group projected a significantly lower body esteem than did the other weight classifications.

In Young and Reeve's (1980) study on personality and body image factors of females differing in percent body fat, Secord and Jourard's (1953) body cathexis scale was administered to college age women. The results indicated that body cathexis was an important factor distinguishing individuals with high and low levels of body fat.

Rhorbacher (1973) examined the effects of weight change on the body image and self concept of overweight and obese boys aged eight through eighteen years. These boys engaged

in an eight week special weight reduction camp. Secord and Jourard's (1953) protocol assessing body cathexis, self cathexis, and body anxiety were administered at the beginning and end of the camp program, and again sixteen weeks following the cessation of the camp experience. Weight loss during the camp was not significantly associated with a positive change in body image and self concept. Weight change after the camp, however, was associated positively with an alteration in body image but not with self concept.

Cremer and Huskill (1969) investigated the relationship between the actual and perceived body contours of overweight and underweight females. The subjects were asked to select the idealized female image most resembling their own, and then alter the line drawings until they were considered to be representative of the subject's shape. A photograph of the subject was superimposed over the altered line drawing in order to ascertain the discrepancy between actual and perceived body contours. The results indicated that the greater the degree of overweight, the greater was the discrepancy between the perceived and real body contours.

Average weight and heavy girls aged six, fifteen, and nineteen years were examined by Brenner and Hinsdale (1978) in order to determine the relationship between body build stereotypes and self identification. The girls were asked to select from a group of three drawings, representing endomorphy, mesomorphy, and ectomorphy, the picture that most resembled themselves and the picture they most wanted

to look like. The subjects were also asked to assign one adjective of each of the eighteen pairs of antonymns which best described the pictures. Endomorphy received a consistently unfavorable impression by all subjects, with the youngest indicating a less negative view than the older subjects. The heavy girls rejected having behavioral stereotypes typically associated with their physique, even after associating the same typical stereotype to the physique most like their own.

Body build identification, preference and aversion in kindergarten age children were investigated by Lerner and Gellert (1969). These children were asked to select the photograph which they felt they most resembled, would most want to look like, and would least like to look like. Only one of the fourteen chubby girls identified her own body type correctly, but nine of the fourteen correctly matched chubby peers with the chubby photograph. This discrepancy between correct self identification and correct chubby peer identification was statistically significant. There was also a consistent aversion to the chubby photograph. Lerner and Schroeder (1971), while conducting a similar study, supported this finding of aversion to the chubby appearance.

While examining the social stereotyping of female body image by elementary school age girls, Caskey and Felker (1971) also investigated the relationship between body type of subject and the assignment of adjectives to three female silhouettes reflecting endomorphy, mesomorphy and

ectomorphy. Regardless of subjects' body type, endomorphy was unfavorably stereotyped. Elementary school girls tended to adopt this unfavorable stereotype, even when it was highly unfavorable to the child's own physique.

The social stereotypes of body image in six through ten year old boys were investigated by Staffieri (1967). These boys were asked to assign adjectives, representing various behavior and personality traits, to silhouettes reflecting extremes in endomorphy, mesomorphy and ectomorphy. Favorable adjectives were assigned to the silhouette representative of mesomorphy, while endomorphy received unfavorable adjectives. The assignment of adjectives was not found to be related to the body type that labelled the silhouettes.

One variable under consideration in Butcher's (1980) analysis of the physical activity participation of adolescent girls was body cathexis. This variable was measured using Secord and Jourard's (1953) instrument (minus three body parts and processes not applicable to grade six girls). The results indicated that body cathexis was not strongly related to physical activity participation, but that it was found to be positively correlated with movement satisfaction.

Cratty (1970) suggested that an individual perceives the body as a vehicle of physical performance and that "a portion of his [her] perception about himself [herself] and his [her] body is related to the quality of the performance his [her] body permits him [her] to achieve" (Cratty,

1970:104). Movement satisfaction refers to the degree of satisfaction or dissatisfaction with one's ability to move under various conditions (Butcher, 1980).

Butcher (1980) assessed the movement satisfaction of adolescent girls through the use of Nelson and Allen's (1970) instrument. This variable was found to be positively related to adolescent girls' participation in physical activity.

Tanner (1969) investigated the relationships of selected measures of body image and movement concept to two types of programs of physical education in the primary grades. One program focussed on basic movement, while the other was activity oriented. Nelson and Allen's (1970) movement satisfaction questionnaire and estimation of body height and width were administered to children in grades one and two. It was revealed that those in the basic movement program had significantly greater movement satisfaction and greater body awareness than those in the activity oriented program.

Johnston (1969) studied the relationships among self concept, movement concept, physical fitness and the effects of a physical conditioning program and a sports skill program upon self concept and movement concept. A combination of low and average physically fit adult men were randomly assigned to a control group and two different physical activity programs. Neither experimental treatment produced a significant effect upon self concept or movement

concept. There was no significant relationship between self concept and physical fitness, or between movement concept and physical fitness. There was, however, a significant positive relationship between self concept and movement concept.

Parental Socialization Influence

"Socializing agents substantially influence the outcome of the socialization process because of their prestige and power to distribute love, rewards, and punishments--mechanics for instilling and confirming values, normative behavior and sanctions" (Greendorfer, 1977:304-305). For the purpose of this study, parental involvement in the socialization of children into physical activity was considered. This involvement was reflected through parents' attitude toward physical activity, parents' attitude toward daughter's physical activity, and the child's perception of parental encouragement.

In a study focussing on socializing agents, Greendorfer (1977) examined the process by which female intercollegiate athletes become socialized into sport. A questionnaire investigating active sport involvement and the influence of family, peers, teachers, and coaches was administered. A multiple regression analysis on the influence of the socializing agents during childhood, adolescence, and adulthood was performed. Peers and parents were more active during childhood, while peers, teachers and coaches were a stronger influence during adolescence.

The attitudes toward physical activity, food and family in obese and nonobese adolescent girls were investigated by Bullen, et al. (1963). In a questionnaire, the girls' were asked about parental sport involvement and parental encouragement of the girl's physical activity participation. Both the obese and nonobese group reported similar degrees of parental involvement and encouragement.

Obese girls were found to be relatively sedentary in the Johnson, et al. (1956) study of the relative importance of inactivity and overeating in the energy balance of obese high school girls. In this same study no significant difference in the attitudes of parents toward strenuous activity for their daughter was observed between the obese and nonobese groups. This particular group of parents may have had preconceived attitudes indicating that strenuous physical activity is not as appropriate for girls as it may be for boys. The parents' attitude may have nothing whatsoever to do with their daughter's fatness. The occurrence of parental sex-stereotyping was not investigated by Johnson, et al. (1956).

Snyder and Spreitzer (1976) examined some correlates of sport participation among adolescent girls. Familial factors', peers', teachers', and coaches' encouragement to participate in sport were included as correlates of participation. In the retrospective portion of this study, during childhood, parents of athletes were found to have been more interested in sports than the parents of the

nonathletes. During high school, the athletes were more likely to receive encouragement to participate in sport than nonathletes. In another retrospective study, Balazs (1975) found that female ex-Olympic athletes perceived parental encouragement to participate and excell in sport as a strong influence during their childhood.

Snyder and Spreitzer (1973) studied family influence and involvement in sports. Direct questions about parental involvement in sport and parental encouragement to participate in sport during childhood were asked of adult men and women. The findings indicated that parents' interest in sport described a consistent and positive relationship to sport involvement, even though not statistically significant. There was also a tendency for the like-sexed parent to have more influence on behavioral involvement than did the opposite-sexed parent.

The mother-daughter relationship and its influence on female sport participation was examined by Kennedy (1975) utilizing case studies of eight pairs of mother and adolescent daughter. From personal interviews, the unique characteristics of each pair and of the subjects as a group were formulated. The mothers were actively involved in sport participation. It was concluded that mothers were a prime factor influencing female sport participation. They were found to spend more time with their daughter than did the fathers, and the mothers introduced their daughters to a variety of sports. Positive encouragement and provision of

opportunities apparently facilitated sport participation of the daughters.

Watson (1975) examined socialization and the competitive process in nine through twelve year old boys and girls involved in an organized sporting environment. Parents, coaches, and peers were the predominant reference groups. Girls were concerned with pleasing their mothers through the vehicle of winning in athletics. Attendance of parents at sporting events was not highly acceptable by either the boys or the girls, however the girls accepted their mothers attendance to a higher degree than their fathers presence. It was suggested that attendance was not encouraged because of the parents' evaluative potential.

Saris, et al. (1980) studied the working capacity and daily physical activity of school children. Those children ranking in the lowest quartile on physical performance capacity were heavier and fatter than those at the highest quartile ranking. It was also revealed that there existed a significant difference between the mothers of the children in the low and high physical performance capacity groups with reference to the mother's attitude toward her child's daily physical activity.

Greendorfer and Lewko (1978) conducted an exploratory study to assess the influence of significant-others on active sport involvement of children. Significant-others included father, mother, brothers, sisters, peers, and teachers. Through a series of multiple regression analyses,

parents of girls were found to be more influential than siblings, and the father was found to be the most influential parent.

H. SUMMARY

In reviewing the literature related to childhood obesity, obese children do not necessarily consume more calories than nonobese children, but the obese group tends to be extraordinarily inactive. Consequently, physical inactivity has been emphasized as an associative factor in the etiology of childhood obesity. The role of physical activity in the prevention and treatment of childhood obesity should reflect the significant part physical inactivity plays in the onset and progression of the obese condition. Prior to the establishment of the specific role physical activity plays in the treatment process, the status of factors relating to physical activity participation requires delineation.

Obese children have been found to be the poorest physical fitness performers. This relationship is emphasized when the activity necessitates the movement of the whole body, whether it be in a horizontal or vertical direction. The obese condition, whether reflected through the percentage of fat, percentage of lean body mass, prevalence of endomorphic traits, or through excessive body weight, negatively affects physical fitness performance.

Motor performance and childhood obesity have received little attention in the literature. It would appear that motor performance may be hampered by the same physical and psychosocial stresses that affect physical fitness performance. For example, the disproportionate distribution of body weight may affect balance. Obese children have been found to have difficulty with some motor performance tasks that are usually successfully performed by nonobese children who are free of motor impairment. Proficiency in motor skill performance influences the social acceptability of the child. Should the obese child lack an acceptable level of proficiency, social rejection may result in the voluntary or involuntary exclusion of the obese child from physical activity participation. Movement consistency and movement constancy may then remain underdeveloped. A cycle may evolve whereby the obese child lacks motor skill proficiency and is denied the oppportunity of gaining the acceptable level of performance proficiency.

Even though obese children have been found to be less physically active than nonobese children, the obese children have a tendency to exhibit a positive attitude toward physical activity. In the normal population, however, attitude has been correlated with some aspects of physical activity. Children tend to be involved in the activities for which they hold the most positive attitudes. The relationship between physical fitness performance and attitude toward physical activity, however, has not been

clearly established. There has been found to exist no significant relationship between attitude and physical fitness, while others report that there exists a significant positive relationship.

A child's attitude toward physical activity may be affected by factors such as personal attributes and socializing agents. Body cathexis, as a subdimension of body image, has been found to be related to self concept. Body cathexis has been found to be a factor distinguishing individuals with low and high levels of body fat. Overweight individuals have shown a discrepancy between actual and perceived body contours. When the individual loses weight, an associated positive alteration in the body image has sometimes resulted. Regardless of the body type of the individual placing the evaluation, aversion and negative stereotypes have been consistently applied to the physique displaying endomorphic traits. Body cathexis has not been shown to be directly related to physical activity participation; however, it has been correlated with movement satisfaction which has been found to be related to physical activity participation.

For the purpose of this study, the influence of socializing agents was represented through parents' attitude toward physical activity, parents' attitude toward daughter's physical activity, and child's perception of parental encouragement. Most of the studies have been retrospective in nature. Parents, both like-sexed and

opposite-sexed, have been found to influence sport and physical activity participation during childhood and adolescence. Obese children receive encouragement to participate, sometimes to the same degree as nonobese children, yet they do not spontaneously respond to this encouragement with primary involvement in physical activity.

CHAPTER THREE

III. METHODOLOGY

This study was undertaken to examine the relationships of selected physical performance parameters and attitude toward physical activity of selected elementary school girls. A physical fitness performance test, a motor performance test, and a questionnaire assessing attitude toward physical activity were administered to seven, nine, and eleven year old girls of varying levels of fatness. The parents of these children responded to a questionnaire designed to determine parental attitude toward their own and toward their daughter's physical activity participation. These variables were selected for consideration on the basis of their proposed relationship to childhood obesity as implied through the review of related literature.

A. SUBJECT SELECTION

Children

Permission for the administration of this study was granted by the Edmonton Public School Board following procedures outlined by the Cooperative Activities Program. Ten elementary schools within this school system were selected on the basis of their proximity to the University of Alberta. These schools were contacted and permission obtained, from the schools' principals, to utilize their female student population for subject selection. This selection process was comprised of four steps.

Firstly, the elementary school girls were screened and selected on the basis of age. The age categories included in this study, seven, nine, and eleven years, were representative of the later childhood years with a bandwidth sufficient to encompass developmental trends. The girls were selected when their ages were consistent with the designated categories throughout the duration of the testing process, which was approximately two months. This procedure was incorporated to avoid the selection of children at either extreme within their age categories, i.e., the girls about to pass into or out of the selected age classifications.

The second step involved obtaining parental permission to assess the girls' skinfold thicknesses. Consent forms were sent home with each child and then returned to the examiner prior to the commencement of the measurement process.

Thirdly, skinfold measurements were utilized to classify each child in one of three fatness levels. The sites selected for the skinfold assessment consisted of the subscapular region, suprailiac region, biceps and triceps. In order for the girl to be chosen as a subject for the study, the sum of these four skinfold measurements had to fall within the 62.5 percentile or below in the categories devised by Quinney and Conger (1981). These categories were slightly modified to encompass those in the 2.5 percentile at both ends of each of the fatness categories. Values in the 37.5 to 62.5 percentile indicated average fatness; those

in the 17.5 to 37.5 percentile corresponded to undesirable fatness; and those at the 17.5 percentile or below were classified as overfat. This last category is 2.5 percentile larger than the proportion of the population of children considered obese by Seltzer and Mayer (1965).

Once the girls had been selected on the basis of age and level of fatness, the fourth step in the selection process involved receiving parental permission for the girls to participate in the testing portion of the study. A consent form was sent to the parents and then returned to the examiner. The final selection was dependent upon parental consent. Approximately 71.2% of those children selected for participation in the present study, also received parental consent. The children, however, could refuse to participate at any point in the study, i.e., the children were volunteers.

After the children had been screened, it was found that each age group did not have sufficient subject representation at each of the three levels of fatness. It was observed during the course of the skinfold screening process that there were very few undesirably fat or overfat seven year old girls in the population from which the sample was drawn. Likewise, there were no overfat eleven year old girls. Consequently, the original study design was slightly modified to include the following: average fat and overfat seven year old girls; average fat, undesirably fat and overfat nine year old girls; and average fat and undesirably

fat eleven year old girls.

TABLE 1: The number of children in each age and fatness classification.

	AGE (years)		
	7	9	11
Average Fatness	12	13	15
Undesirable Fatness	0	5	11
Overfat	4	12	0

Parents

Parents of the potential subjects were sent a letter apprising them of the study. Enclosed with this letter were two questionnaires directed toward determining parental influence on the child's attitude toward physical activity. Both parents were asked to respond to these questionnaires, i.e., their response was voluntary.

Unfortunately, not all of the parents contacted responded to the questionnaire. Those that did respond were classified according to their daughter's age and fatness level. Because of the possibility of subject mortality, parents of the subjects that dropped out of the study were still included as subjects in the study.

TABLE 2: The number of mothers (M) and fathers (F) for each classification of daughter's age and fatness.

	AGE (years) 7		9		11	
	M	F	M	F	M	F
Average Fatness	13	4	12	11	13	9
Undesirable Fatness	0	0	4	2	7	3
Overfat	4	3	11	7	0	0

B. INSTRUMENTS

Physical Fitness

The C.A.H.P.E.R. Fitness Performance II Test (Gauthier, et al., 1980). was utilized to establish measures of physical fitness performance. This test had been previously applied to a sample of 9,000 Canadian youth aged six to seventeen years. Norms corresponding to these age categories were devised from the results.

The test consists of six items including the following: flexed arm hang, shuttle run, one-minute speed sit-ups, standing long jump, 50 meter run, and an endurance run/walk (7 and 9 year olds covered 800 meters; 11 year olds covered 1600 meters). The best scores achieved by each subject constituted the raw scores for each of the six items.

Motor Performance

Taylor (1981) compiled a test of motor impairment based on the Stott Test of Motor Impairment (Stott, et al., 1972) and Gubbay's Screening Test (Gubbay, 1975). The ten item

test was modified to five items and monitored the following: control and balance of the body while immobile, control and coordination of the upper limbs, and control and coordination of the body while in motion. These tests were appropriate for the selected age groups.

The five items incorporated to measure these factors included the following: stork balance, catching off a wall, board balance I, Gubbay's clap and catch, and a jump with a one-foot landing. In the throwing and catching item, the total number of sucessful catches was tabulated for each subject. The six types of catches in Gubbay's clap and catch item were assigned values, in an ascending order, from one through six. The easiest type of catch, catching with both hands, was assigned a value of one, whereas the most difficult type, catching with the preferred hand after four claps, was assigned a value of six. The most difficult item successfully completed was utilized as the raw score for the overall clap and catch item. For the balancing activities, the averages of the three trials per leg were utilized as the raw scores for each of the items.

<u>Child's Attitude Toward Physical Activity</u>

Kenyon (1968) devised a questionnaire to evaluate attitude toward physical activity. The test involved a semantic differential response to eight pairs of antonyms ascribed to six subdomains of physical activity. Simon and Smoll (1974) modified this questionnaire by incorporating wording alterations so that the test would be appropriate

for children in grades four through six. This test was utilized in a pilot study and it was found that seven and nine year old girls were unable to comprehend the questionnaire. Consequently, the instrument was further modified in the method of presentation of the items and in the possible responses. The statements were rephrased as questions. The semantic differential was replaced by four responses indicating the direction and degree of feeling. The possible responses included "really like, like, dislike, and really dislike". These written responses were complemented by incorporating happy and sad faces to facilitate comprehension by the seven year old children.

The same subdomains of physical activity, as outlined by Simon and Smoll (1974), were utilized in this study. These included viewing physical activity in the following contexts: as a social experience, for health and fitness, as a thrill but involving some risk, as the beauty in human movement, for the release of tension, and as long and hard training. An additional subdomain, physical activity for competition as outlined by Butcher (1980), was incorporated into the study.

The four response categories were assigned numerical values indicating direction and intensity of feeling. The values ranged from one to four and were assigned in ascending order to really dislike through really like. The values were summed for each subdomain in each age and fatness level classification in order to obtain an attitude

score for each physical activity dimension. Higher scores were indicative of a more positive attitude toward physical activity.

Correlates of Child's Attitude Toward Physical Activity

Body Cathexis. Secord and Jourard's (1953) body cathexis scale was modified to determine the degree of satisfaction or dissatisfaction with various body parts. The original scale was reduced from 43 to 12 items. Some of these twelve items were not included in the original scale. The five response Likert scaling technique was replaced by four possible responses to indicate the direction and strength of feeling. The responses ranged from "really like" to "really dislike". Scores were obtained by ascribing values of one through four to the responses "really dislike" through "really like" in ascending order. These values were summed over the 12 items to achieve an overall measurement of body cathexis. The higher the score, the greater was the degree of body satisfaction.

Movement Satisfaction . Nelson and Allen's (1970) scale for the appraisal of movement satifaction was the basis for the evaluation of movement satisfaction or dissatisfaction. This test was modified to involve 14 rephrased items, some of them not included in the original instrument, and the same response scaling utilized in the measurement of body cathexis. The items included and the presenation format were intended to facilitate comprehension by seven year old children.

Children's Perception of Parental Encouragement. Butcher (1980) designed four questions to assess the level of parental encouragement for the child's participation in physical activity. These four questions evaluated the children's perception of parental influence under the following categories: parental participation in physical activity with the child, parents watching the child participate in physical activity, parental encouragement of the child to participate in physical activity, and parents wishing their daughter to be good in the performance of physical activities. The original responses were modified to include the following four responses: not applicable/don't know, never, sometimes, and often. An ordinal scale, ranging in ascending order from zero through three, was applied to the response categories. The scores on each of the four items were summed and recorded as the raw scores for each subject.

Parents' Attitude Toward Physical Activity. Simon and Smolls (1974) instrument, utilizing six subdomains of physical activity and a semantic differential response technique, was used for the assessment of parents' attitude toward physical activity. Butcher's (1980) subdomain of physical activity for competition was incorporated into this instrument. Prior to summing the total for each physical activity subdomain, four adjectives of the eight semantic differential scales were inverted to have the positive adjectives with the highest scores. The responses were

summed for each subdomain in order to obtain a measurement of seven specific aspects of physical activity.

Parents' Attitude Toward Daughters' Physical Activity . Simon and Smoll's (1974) test was utilized with one modification. The parents were asked to answer a questionnaire similar to that used to assess parents' attitude toward physical activity, but to think in terms of their daughter. They were asked to reflect on their opinion of the relationship between the seven physical activity subdomains and their daughter's physical activity participation. The original physical activity subdomains were modified in a manner relating each dimension to the child's participation. The method for obtaining the raw scores was the same as that utilized in determing parents' attitude toward physical activity.

C. COLLECTION OF DATA

Once the subjects, children and parents, were selected, data were collected in three separate testing sessions. The questionnaire was administered during the first session. The test administrator explained the directions for each of the questionnaire components. The nine and eleven year old subjects were then allowed to respond to the items and encouraged to ask questions for clarification. In order to facilitate comprehension at the seven year old level, each item was read to the group of subjects accompanied by consistent instructions and examples.

The evaluation of motor performance was conducted during the second testing session. Due to restricted gymnasium time allotment, the throwing items were administered consecutively and followed by the three types of balancing items.

The physical fitness performance test was administered during the third testing session. This testing protocol necessitated the availability of the entire gymnasium space for the running items. Due to restricted time allotment for these facilities, two of the running items, the 50 meter run and the endurance run, were administered consecutively, interspersed with a short recovery time.

These three testing sessions spanned a two month period. This factor introduced the possibility of subject absenteeism. Some of the subjects were absent from some of the testing sessions. An attempt was made to administer the test to these subjects when the test administrator returned for the next testing session. Occasionally, a subject was not allowed to complete the entire regimen of items as their teacher would not allow them an extended absence from the classroom. These factors account for the sample size variability for each test and for various test items.

D. STUDY DESIGN

Female elementary school children and their parents served as subjects for this study. The parents were classified according to their daughter's age and fatness

level category. Mothers and fathers were treated as separate respondents.

Four study designs emerged from the data collection process. The first was comprised of the nine year old age level and the three levels of the fatness factor. The second study design incorporated three levels for the age factor and two levels for the fatness factor. Seven, nine, and eleven years of age were the age levels. Due to the insufficient subject representation at the original three fatness classifications, the undesirable fatness and overfat categories were amalgamated into one level called above average fatness. This category and average fatness were utilized as the two levels of the fatness factor.

The third study design examined seven and nine year old girls at the average fatness and overfat classifications. These two groups were combined with eleven year old girls at the average and undesirable fatness levels to form the fourth study design. In order to facilitate the distinction between the average and undesirable fatness categories, the subjects in the undesirable fatness classification exhibiting the three lowest skinfold measurements were excluded from this level. The undesirable level was reclassified as overfat. Consequently, the fourth study design examined seven, nine and eleven year old girls in the average and overfat fatness classifications. (See Appendix B for specific study designs and sample sizes.)

E. VARIABLE TRANSFORMATION

The computer program Statistical Package for the Social Sciences (SPSS, 1975) was utilized for the variable transformation process. The raw data from all tests were entered into the computer through SPSS. The raw data were transformed into a format appropriate to the nature of the variables and the projected statistical analyses. Physical fitness and motor performance were examined in their original form, as well as in their transformed state. These procedures did not destroy the original data format.

Firstly, the fatness levels were reclassified according to the requirements of one of the two study designs that emerged from the data collection process. This procedure served to encompass undesirable fatness and overfat into one category labelled above average fatness.

In order to obtain comparability of observations derived by the different procedures utilized in the physical fitness performance test and the motor performance test, the raw scores were converted to standard scores (Ferguson, 1976). The standard scores of the six items of the physical fitness performance test were averaged to obtain one overall measure of mean fitness performance. The same procedure was utilized for the eight items of the motor performance test in order to obtain one overall measurement on that variable.

The variables included in this study were not of a consistent nature. Mean physical fitness performance, mean motor performance, and parents' attitude toward their own

and toward their daughter's physical activity participation were interval in nature. For the other variables, the possible responses included in the instrument indicated the direction and relative strength of the subject's response. The distance between these possible responses could not be considered equal, therefore these variables were identified as being ordinal.

To facilitate the determination of relationships among the variables, all of the variables were reclassified. Due to the small number of subjects utilized in this study, each variable was divided into two nominal categories. The criterion for dichotomizing was specific to the nature of the possible responses to each variable.

Physical fitness performance and motor performance were represented by mean standard scores. Consequently, the point of division between "below the mean" and "mean or above" was zero, which is the mean of standard score values.

Body cathexis, movement satisfaction, child's perception of parental encouragement, and child's attitude toward physical activity were divided on the basis of the midpoint between the lowest and highest possible scores. The two categories were labelled negative attitude and positive attitude. The positive attitude included the midpoint and above scores, whereas the negative attitude was used to describe scores below the midpoint.

Parental attitude toward their own and toward their daughter's physical activity participation were reclassified

on the basis of two criteria. Where some of the scores obtained fell below the midpoint and between the lowest and highest possible scores, the pattern of division was similar to that utilized in the child's attitude toward physical activity (i.e., negative and positive attitudes). There were, however, items where no negative attitudes were indicated by the parents. This occurrence was noted and the point of division was assigned to the midpoint between the lowest and highest attained scores. These categories identified those with a "positive attitude" from those with a "more positive attitude".

F. STATISTICAL ANALYSES

The statistical analyses performed on the data were selected on the basis of the variables involved, the study designs incorporated, and the research questions under consideration. The variables were examined in their original format and in their transformed state. The status and relationships among these variables, within the boundaries of the four study designs, were analyzed utilizing several of the SPSS formats.

Initially, descriptive statistics were employed in order to evaluate the general nature of the data while in its original form. The number of cases, mean, standard deviation, and variance of the ordinal variables were calculated. These variables included body cathexis, movement satisfaction, child's perception of parental encouragement,

and child's attitude toward physical activity. The interval variables included physical fitness, motor performance, and parents' attitude toward their own and toward their daughter's physical activity participation.

Physical fitness and motor performance also were examined item by item and in their original data format. Analysis of variance was administered to these variables in three study designs. A one-way analysis of variance was applied to nine year old girls with three fatness levels. A two-way analysis of variance was administered to girls seven and nine years of age with two fatness levels, as well as to seven, nine and eleven year old girls with two fatness levels. (See Appendix B for study designs.) This statistic was utilized to determine the existence of significant differences between the means accruing from the children's performances.

While controlling for age, the status of the variables at each of the fatness levels were examined within the confines of the first two study designs. The chi-square statistic was utilized to determine whether or not the distribution of the variables, in their respective categories, was random or indicative of some degree of association (Ferguson, 1976; Weber and Lamb, 1970). A significant chi-square statistic would illustrate that the obtained distribution was not equivalent to the distribution expected if the traits were randomly distributed, i.e., that the obtained distribution was not random and that some

degree of association existed among the occurrences of the variables. The Chi-square is not a probability, but it is converted into a probability figure in the form of the level of significance (Nie, et al., 1975). From this significance level is ascertained the probability that the observed joint distribution of cases would have happened by chance when, in fact, there was no association between the variables in the population (Nie, et al., 1975).

To complement the chi-square statistic, a measure of association illustrated the relative strength of the association discovered using chi-square. Considering the nature of the variables and the two study designs, phi and Cramer's V were selected as appropriate measures of association. Phi was applied where the number of rows and columns were equivalent, and it also corrected for the fact that the chi-square is directly proportional to the size of the sample; whereas Cramer's V is phi modified to adjust for non-equivalent numbers of rows and columns in the chi-square analysis (Nie, et al., 1975).

Another measure of association was employed as the final step of the statistical process. For both study designs, the correlations among the interval variables were assessed utilizing the SPSS format PEARSON CORR. This procedure produced Pearson product-moment correlation coefficients among mean fitness performance, mean motor performance, and parents' attitude toward their own and toward their daughter's physical activity participation.

Through this statistic, the type and strength of the linear relationship between each grouping of two variables from this variable set was assessed.

For all of the statistical procedures, the level of significance indicative of an acceptable probability was 0.05. This significance level reduced the probability of concluding that relationships existed when, in fact, there were no relationships among the variables. This figure has been accepted frequently in studies of this nature.

CHAPTER FOUR

IV. RESULTS AND DISCUSSION

The purpose of this study was to investigate the possible associations among physical performance parameters, and attitude toward physical activity and its correlates of elementary school girls with different levels of fatness. These girls were selected on the basis of age, level of fatness, and parental consent.

The parents of these girls responded to a questionnaire designed to assess parental attitude toward their own and toward their daughter's physical activity participation. The girls were examined on a physical fitness performance test, motor performance test, attitude toward physical activity questionnaire, and questions designed to elicit a response to their body cathexis, movement satisfaction, and perception of parental encouragement to participate in physical activity. These variables were included on the basis of previous research conducted in the areas of physical fitness, motor performance and attitude toward physical activity as they related to childhood obesity.

The statistics utilized for the analysis of the data reflected the types of variables examined in this study. Descriptive statistics, analysis of variance, chi-square, phi and Cramer's V, and Pearson product-moment correlations described the relationships between the variables and the age/fatness classifications of the two study designs. The analytical results, complemented by observations gleaned

through the data collection process, provided an insight into the nature of the variables under consideration.

A. GENERAL OBSERVATIONS

Although not statistically analyzed, general observations may advance a perspective of the nature of the problem not revealed through statistical procedures. This analysis, when complemented by observations made during data collection, may facilitate a more holistic examination of the phenomena under investigation, i.e., the obese condition and its effect on those involved.

During the initial phase of the study, the screening process, problems emerged concerning the number and nature of the sample being compiled. Firstly, there was an apparent absence of overfat children aged seven and eleven years in the population from which the sample was drawn. At nine years of age, there appeared to be greater evidence of childhood obesity. From this observation, it may be that the period prior to nine years of age may be ripe for intervention in the onset and progression of childhood obesity.

Another aspect of the screening process involved obtaining permission for subject participation. This involvement was voluntary on the part of both the children and parents. A sampling procedure of this nature may introduce bias with repect to the type of children and parents willing to become a part of the study. It may be

that only those interested in physical activity and/or those who see obesity as a problem would have granted permission to participate as subjects. This would probably affect the results of both the physical performance and the attitude tests by apparently soliciting information from those who may already be positively predisposed toward physical activity.

Once the screening had been completed, the data collection process furnished evidence supporting the possibility of the sampling problem. Most of the children indicated enthusiasm for involvement in the study. Whether this interest was due to the nature of the tests or to class absenteeism, however, was not discerned.

The attitude questionnaire administration did not lend itself to comments about the children or their condition. Even with some minor disruptions at the seven year level, the testing atmosphere proved to be fairly quiet with only minimal converstation for points of clarification among the subjects.

On the other hand, the physical performance tests provided some interesting observations. Some of the children, the overfat ones in particular, had difficulty executing three of the physical fitness performance items. Most of the overfat children could not support their body weight in the flexed arm hang. Some of the overfat girls were unable to complete any or only a few sit-ups. Additionally, some of the overfat girls were noticed to have

walked for a greater percentage of the time during the endurance run. The most overfat child in the study walked the entire distance of the endurance run. These findings were not unexpected when reflecting on the evidence of the related literature. The greater proportion of body fat as compared to lean body mass, i.e., active muscle to perform physical tasks, found in obese children combined with the declaration of obese individual's handicap while performing skills involving the movement of the total body attest to these observations (Hendry and Gillies, 1978; Slaughter, et al., 1977).

The children's performance on the motor ability tests introduced some general comments. The seven year olds, regardless of fatness level had difficulty successfully completing the throwing and catching items. This is the result of their level of motor development and also may be associated with socialization into skills culturally normative for girls, possibly excluding throwing and catching.

Fatness, however, appeared to influence the results of the balancing tasks. In the performance of the stork balance and board balance, the overfat children appeared to exhibit a greater incidence of extraneous movement, even though this movement did not always disrupt the execution of the skill. Arnheim and Sinclair (1975) had suggested that the disproportionate distribution of body weight found in overweight individuals may hinder the performance of tasks

requiring balance. The observations of the jump and balance item proved to be congruent with the findings of Henderson and Stott (1977) who found that obese children had difficulty performing the task. They suggested that the excessive fatness, as opposed to motor impairment, was the likely cause of such observations. This difficulty was not always reflected in failure, but there was clearly consistent evidence of apprehension exhibited by most of the overfat children prior to the execution of the task.

B. ANALYTICAL RESULTS

The statistical procedure performed on the data expanded and clarified the knowledge obtained through the general observations as well as introducing new findings. These procedures were utilized to determine the existence of systematic and significant associations between the variables and specific age and fatness levels.

Physical Fitness Performance

Contrary to the general observations and literature on physical fitness performance, this particular sample of elementary school girls exhibiting above average fatness did not produce a significantly lower level of overall physical fitness performance indicated by a single index. Statistically insignificant chi-square values were found between fatness levels and physical fitness performance, while controlling for age. The observed distribution of cases in these categories was not significantly different

from the distribution expected if the characteristics were random in the categories. The variables were statistically independent, i.e., a case's value on the overall fitness performance index was not significantly related to its value on the fatness variable.

TABLE 3: Chi-square values for mean physical fitness performance. (fat 3=average, undesirable, overfat; fat 2=average, above average).

AGE	FAT	N	CHI-SQUARE	SIGNIFICANCE	ASSOCIATION (Cramer's V) (Phi)
9	3	32	.14	.933	C .066
7	2	18	.712	----	P .000
9	2	32	.002	.961	P .008
11	2	27	.175	.675	P .081

Much of the literature had suggested that obese adolescents were less physically active than their nonobese counterparts (Corbin and Pletcher, 1968; Bullen, et al., 1964; Bullen, et al., 1963; Johnson, et al., 1956). This may imply that the lack of physical activity may have resulted in a lower level of physical fitness than those participating in physical activity to a greater extent. Saris, et al., (1980) found that as percentage of body fat and weight increased in young children, there was a corresponding decrease in physical work capacity, i.e., a lower level of physical fitness performance. Cureton (1975) found that body fat and endomorphy negatively correlated with running and jumping performance. Slaughter, et al., (1977) conducted a study which concluded that skinfold

measurements were negatively correlated with running and pull-ups.

The lack of congruency between the actual mean physical fitness performance and that expected on the basis of the literature may be attributed, in part, to the sampling and screening techniques, as well as to the categorization of performance level. Firstly, the sample size in the cells of the chi-square contingency tables were fairly small and may not accurately represent the relationship between fatness and fitness in the population.

Secondly, as implied in the general observations, a limitation of the study may be that those participating in the study may have been individuals normally physically active, regardless of fatness level. If this were the case, one might expect that the fatness handicap may have been overshadowed by the level of physical activity in which the child was engaged. Their participation produced a level of physical fitness performance equivalent to those of average fatness.

Thirdly, the fatness categories may not have been mutually exclusive with respect to their effect on physical performance. The upper end of one category and the lower end of the next highest category, i.e., between average fat and undesirable fat, are very close in amount of fat. The difference between these amounts may not be great enough to affect an appreciable difference in the level of physical fitness performance.

A sampling approach refining these fatness categories to avoid such overlap may have produced results reflecting the discrepancies in fitness performance consistently supplied by the literature. One approach would have been to use the three fatness categories, but only utilize values near the mean of each fatness level as representing that particular degree of fatness. Another example would involve the examination of the characteristics between average fatness and the overfat category or between average fatness and an expanded overfat level which included the upper portion of undesirable fatness. These more distinct categories may better reproduce the true effect of fatness on fitness performance in the population.

A similar principle may apply to the categorization of physical fitness performance levels. The two categories, representing "below the mean" followed by "mean and above" physical fitness performance, were distinguished by the value of the mean. There may have been considerable overlap in this performance realm with the overfat children clustering around the mean. In order to determine the effect of fatness on fitness, it may not be enough to ask if there is a difference in the distribution of those above and below the average. It may be more beneficial to establish whether or not the differences in fitness are enough to handicap performance in daily tasks culturally normative to the age groups, i.e., determine which levels of fatness are accompanied by physiological and psychosocial problems. This

might be accomplished by polarizing the two performance levels to a greater extent. The lower category may be parallel to the handicapping of daily pursuits. The question would be to determine whether or not a greater proportion of overfat than average fat children fell into this handicapping fitness category.

The results of the chi-square analysis illustrated the limitations of using a composite measure of physical fitness. If a child performed poorly on one item and then performed well on another, then these two results would 'cancel' each other out. An item by item analysis would provide more information specific to the physical fitness parameter under investigation, rather than on the general nature of physical fitness performance illustrated by the overall measurement.

When physical fitness performance was examined item by item, the analysis of variance indicated statistically significantly different performance means between children in some of the various age and fatness classifications. The performances on the physical fitness items by nine year old girls at three fatness levels were not found to be statistically significantly different. The fatness classification boundaries may have been too close together to result in significant differences in performance. For example, the sum of four skinfold measurements representing the extreme fatness level in the average fat category was only slightly lower than the fatness level initiating the

undesirable fatness level.

TABLE 4: Analysis of variance on the physical fitness of nine year old girls at three fatness levels. (See Appendix B for study design and Appendix G for variable definitions).

VARIABLE	F RATIO	F PROBABILITY	SCHEFFE (Pairs of Groups Significantly Different)
PFAH	1.130	.337	none
PFSR	1.700	.200	none
PFFM	2.953	.068	none
PFER	1.028	.370	none
PFSU	2.021	.155	none
PFLJ	0.534	.592	none

TABLE 5: Analysis of variance on the physical fitness of seven and nine year old girls at average and overfat levels of fatness. (See Appendix B for study design and Appendix G for variable definitions).

VARIABLE	SOURCE OF VARIATION	F	SIGNIFICANCE OF F
PFAH	Fatness	3.412	.074
	Age	0.396	.534
	Interaction	1.134	.295
PFSR	Fatness	1.689	.203
	Age	0.950	.337
	Interaction	3.202	.083
PFFM	Fatness	1.681	.204
	Age	0.106	.747
	Interaction	0.455	.505
PFER	Fatness	0.021	.886
	Age	0.000	.998
	Interaction	0.065	.801
PFSU	Fatness	5.225	*.029
	Age	18.079	*.000
	Interaction	0.079	.781
PFLJ	Fatness	2.332	.135
	Age	1.718	.197
	Interaction	0.383	.540

* $p < .05$

TABLE 6: Analysis of variance on the physical fitness of seven, nine and eleven year old girls at two fatness levels. (See Appendix B for study design and Appendix G for variable definitions).

VARIABLE	SOURCE OF VARIATION	F	SIGNIFICANCE OF F
PFAH	Fatness	4.369	*.042
	Age	2.955	.061
	Interaction	0.442	.645
PFSR	Fatness	1.841	.181
	Age	1.833	.171
	Interaction	2.725	.076
PFFM	Fatness	5.102	.027
	Age	0.266	.768
	Interaction	1.370	.262
PFER	Fatness	0.001	.979
	Age	15.858	*.000
	Interaction	0.038	.963
PFSU	Fatness	5.313	*.025
	Age	11.200	*.000
	Interaction	0.157	.855
PFLJ	Fatness	2.437	.124
	Age	1.993	.145
	Interaction	0.251	.779

* $p < .05$

Note: For PFER (endurance run) the eleven year old girls ran twice as far (1600m) as the seven and nine year old girls (800m).

TABLE 7: A posteriori tests for significant difference found in the analysis of variance on the physical fitness of seven, nine and eleven year old girls at two fatness levels. (See Appendix B for study design and Appendix G for variable definitions).

VARIABLE	SOURCE OF VARIATION	SCHEFFE (Pairs of Groups Significantly Different)
PFAH	Fatness	Not applicable
PFFM	Fatness	Not applicable
PFER	*Age	(1,3) (2,3)
PFSU	Fatness Age	Not applicable (1,2) (1,3)

* In the PFER (endurance run), the eleven year olds ran twice as far (1600 meters) as did the seven and nine year olds (800 meters).

When the performance results of the seven and nine year old girls, as well as the seven, nine and eleven year old girls' grouping were examined, however, statisitically significant relationships to age and fatness were found. The nine and eleven year old girls were able to complete a greater number of sit ups than the seven year old girls. These younger children did not exhibit as high a level of abdominal strength and power as the older girls. This may be related to growth and developmental factors as reflected by age.

Sit ups, as well as the flexed arm hang and the fifty meter run, were found to be significantly related to fatness level. The girls exhibiting a greater proportion of body fat performed fewer sit ups, ran slower than, and did not

suspend themselves by their arms for as great a period of time as the girls possessing a lower proportion of body fat. These findings are congruent with those in the literature which indicated that activities necessitating the movement of the whole body in a vertical or horizontal direction were negatively affected by an increased proportion of body fat (Slaughter, et al., 1977; Cureton, et al., 1975; Espenschade, 1963). The tissue to tissue approximation produced by the large abdominal girth often found in overfat children, as well as a lack of abdominal muscle strength, negatively affected the performance on sit ups.

Motor Performance

Congruent with the results of mean physical fitness performance, mean motor performance, as calculated in this study, was not significantlyassociated with fatness level. The variables of fatness and mean motor performance, while controlling for age, were statistically independent. A case's value on fatness was not related to the same case's value on mean motor performance.

TABLE 8: Chi-square values for mean motor performance. (fat 3=average, undersirable, overfat; fat 2=average, above average).

AGE	FAT	N	CHI-SQUARE	SIGNIFICANCE	ASSOCIATION (Cramer's V) (Phi)
9	3	32	1.669	.434	C .228
7	2	18	.595	----	P .189
9	2	32	.653	.419	P .143
11	2	27	.175	.675	P .081

Throwing skills were apparently not negatively affected by excessive body fat. This finding might imply that the above average fatness girls receive adequate opportunity for the establishment of movement consistency and the development of movement constancy (Keogh, 1975). The results also indicated that throwing and catching were not related to fatness level.

Balancing was also not hindered by excessive body fat. From the results of this study, it would appear that the performance of items focussing on balance were not necessarily hampered by the distribution of excess body weight as was implied in the literature by Arnheim and Sinclair (1975) and Henderson and Stott (1977).

Factors similar to those involved in physical fitness performance may have been factors producing the lack of significant relationships between fatness and motor performance. Once again, the sampling technique may have affected the results. The sample size was not large enough to be truly representative of the characteristics in the population. Should individuals who are normally physically active have been the ones to participate as subjects in this study, it would be expected that, regardless of weight classification, they would not reflect a lower level of motor performance because of the activity level's positive influence on skill acquisition.

Also, there may have been some overlap between the two categories of mean motor performance. As with the physical

fitness performance categories, "below the mean" and the "mean or above" should have been polarized to a greater extent. This procedure might enable the examination of fatness and motor performance representing a handicap to daily functioning.

Another factor affecting these results may have been the items selected for examination. The balancing items utilized in this study were designed to concentrate on motor function, rather than on the integration of cognitive, perceptive, and emotional factors prevalent in daily pursuits. Overfat girls may not have significant problems successfully executing isolated balancing manoeuvers, but if this component was combined with others normally comprising daily living and playing skills, the effect may have been different. In fact, it may be worthwhile to investigate the relationship between level of fatness and motor performance with respect to culturally normative skills as they appear in the child's environment. These skills, and not isolated components which proved to be a limitation of the present study, are the ones by which the child's performance is usually judged by the peer group. For example, skipping would be a culturally normative skill, i.e., an everyday activity, of childhood in Edmonton. Do overfat children exhibit a similar or a different level of skill for skipping than those of average fatness? If a difference was found, questions as to what caused such a result would require investigation. Could these results be attributed to the

level of fatness, level of fitness, peer pressure inhibiting skipping participation, or a combination of these factors?

When motor performance was examined item by item, the analysis of variance indicated statistically significant differences in performances between the children at some of the various age and fatness levels. The only motor performance item found to be significantly related to fatness level was the jump and balance (left foot). With reference to nine year old girls at three fatness levels, there was found to be a significant difference between the performances of the average fat as compared to the overfat girls. The average fat girls were able to successfully complete the task and balance for a greater period of time than the overfat girls. This finding is congruent with the observation of Henderson and Stott (1977) who noted that the obese children had difficulty performing this particular task. This failure was attributed to excessive body fat, which handicaps jumping and then landing with all the weight on one foot, rather than being a neurologically based dysfunction.

When the performance on the same variable was analyzed with reference to seven, nine and eleven year old girls, a significant interaction effect was found. In the average fatness category, the nine and eleven year old girls were able to balance longer than the girls seven years of age. This may have been related to the growth and development of the child and its relationship to the performance of certain

TABLE 9: Analysis of variance on the motor performance of nine year old girls at three fatness levels. (See Appendix B for study design and Appendix G for variable definitions).

VARIABLE	F RATIO	F PROBABILITY	SCHEFFE (Pairs of Groups) (Significantly Different)
MPSBL	0.592	.559	none
MPSBR	1.735	.194	none
MPBBL	0.412	.666	none
MPBBR	0.037	.964	none
MPJBL	3.983	.029	*1,3
MPJBR	0.357	.703	none
MPCOW	0.206	.815	none
MPCAC	0.302	.742	none

* $p < .05$

motor tasks.

For the same group of children, the nine year old girls at the average fat level were better performers than the overfat girls. The greater proportion of body fat negatively affected the performance requiring the child to project her body vertically and then landing to balance with the entire weight of the body on one foot. Failure to successfully complete this task illustrates the symbiotic nature of physical fitness and motor performance, i.e., the strength requirement of the motor task exceeded that of the children, which resulted in the failure to successfully complete the task.

The results of the remaining seven motor performance itmes were not found to be significantly different among the three fatness levels for nine year old girls. With respect to seven, nine and eleven year old girls, these variables were not found to be significantly related to fatness, but

TABLE 10: Analysis of variance on the motor performance of seven and nine year old girls at average and overfat levels of fatness. (See Appendix B for study design and Appendix G for variable definitions).

VARIABLE	SOURCE OF VARIATION	F	SIFNIFICANCE OF F
MPSBL	Fatness	0.273	.604
	Age	1.437	.238
	Interaction	0.411	.525
MPSBR	Fatness	1.322	.257
	Age	0.193	.662
	Interaction	0.541	.466
MPBBL	Fatness	0.249	.621
	Age	1.155	.289
	Interaction	1.002	.323
MPBBR	Fatness	0.115	.736
	Age	6.637	*.014
	Interaction	0.010	.920
MPJBL	Fatness	7.471	*.010
	Age	13.152	*.001
	Interaction	12.930	*.001
MPJBR	Fatness	.125	.726
	Age	3.538	.068
	Interaction	2.880	.098
MPCOW	Fatness	0.000	.993
	Age	44.204	*.000
	Interaction	0.579	.452
MPCAC	Fatness	0.006	.939
	Age	23.947	*.000
	Interaction	1.228	.275

* $p < .05$

TABLE 11: Significant interaction effects on jump and balance for girls seven and nine years of age at two fatness levels. (See Appendix B for study design and Appendix G for variable definitions).

SOURCE OF VARIATION	F	SIGNIFICANCE OF F
Age within average fat	25.74	*.000
Age within overfat	0.63	.432
Fatness within seven years	2.69	.108
Fatness within nine years	13.49	*.001

* $p < .05$

all of them were related to age. Seven year old girls did not balance as long as the eleven year old girls while performing the stork balance (left foot), the board balance (both feet), and the jump and balance (both feet). An overall significant difference was found in the performance of the stork balance (right foot) but the Scheffe *a posteriori* test did not indicate any significant individual cell mean differences.

For the catch off the wall, the nine year old girls achieved a greater number of successful catches than the seven year old girls. Likewise, the eleven year old girls were more successful than the nine year old girls. In the clap and catch task, both the nine and eleven year old girls were significantly more successful than the seven year old girls. From these results, physical maturity, as represented by age, directly afffected performance in these specific motor tasks. The extent to which these results were influenced by practice was not investigated within the boundaries of the present study.

TABLE 12: Analysis of variance on the motor performance of seven, nine and eleven year old girls at two fatness levels. (See Appendix B for study design and Appendix G for variable definitions).

VARIABLE	SOURCE OF VARIATION	F	SIFNIFICANCE OF F
MPSBL	Fatness	0.055	.815
	Age	5.126	*.009
	Interaction	0.383	.683
MPSBR	Fatness	0.446	.507
	Age	3.201	*.048
	Interaction	0.814	.448
MPBBL	Fatness	1.007	.320
	Age	5.493	*.006
	Interaction	0.642	.529
MPBBR	Fatness	0.272	.604
	Age	8.360	*.001
	Interaction	0.021	.980
MPJBL	Fatness	3.571	.064
	Age	7.444	*.001
	Interaction	4.733	*.013
MPJBR	Fatness	0.058	.810
	Age	3.729	*.030
	Interaction	1.551	.220
MPCOW	Fatness	0.473	.494
	Age	46.602	*.000
	Interaction	0.720	.491
MPCAC	Fatness	0.048	.827
	Age	20.153	*.000
	Interaction	0.654	.524

* $p < .05$

TABLE 13: *A posteriori* tests for significant differences found in the analysis of variance on the motor performance of seven, nine and eleven year old girls at two fatness levels. (See Appendix B for study design and Appendix G for variable definitions).

VARIABLE	SOURCE OF VARIATION	SCHEFFE (Pairs of Groups Significantly Different)
MPSBL	Age	(1,3)
MPSBR	Age	(none)
MPBBL	Age	(1,3)
MPBBR	Age	(1,3)
MPJBL	Age	(1,2) (1,3)
MPJBR	Age	(1,3)
MPCOW	Age	(1,2) (1,3) (2,3)
MPCAC	Age	(1,2) (1,3)

TABLE 14: Significant interaction effects on jump and and balance for girls seven, nine and eleven years at two fatness levels. (See Appendix B for study design and Appendix G for variable definitions).

SOURCE OF VARIATION	F	SIGNIFICANCE OF F
Age within average fat	10.43	*.000
Age within overfat	2.53	.088
Fatness within seven years	1.78	.187
Fatness within nine years	8.91	*.004
Fatness within eleven years	0.00	.971

Personal Attributes

The personal attributes under investigation in this study were body cathexis and movement satisfaction. Once again the chi-square analysis of the data did not elicit a significant association among the fatness levels and personal attribute variables. A case's value on body

cathexis or on movement satisfaction was not related to its value on fatness.

TABLE 15: Chi-square values for body cathexis (fat 3=average, undesirable, overfat; fat 2=average, above average).

AGE	FAT	N	CHI-SQUARE	SIGNIFICANCE	ASSOCIATION
9	3	32	1.247	.536	C .197
7	2	18	.234	----	P .332
9	2	32	1.117	.291	P .187
11	2	27	.167	.683	P .079

In the literature, the relationship between body cathexis and body image with level of fatness has been dependent upon the age of the sample investigated. Young and Reeve (1980) studied college women and the results revealed that body cathexis was an important factor distinguishing individuals with high or low body fat levels. Children, however, have been found to display a discrepancy between body image perception, a concept encompassing body cathexis, and the perception of others' physical characteristics. Examples of overfat or endomorphic body types have consistently received unfavorable evaluations by children, regardless of the fatness level of the respondent. (Brenner and Hinsdale, 1978; Caskey and Felker, 1971; Lerner and Schroeder, 1971; Lerner and Gellert, 1969). The above average fat children reflected the average fat children's attitude toward excessive body fat, i.e., assigning a negative stereotype to the overfat or endomorphic body type.

Children who are overweight appear to accept these negative stereotypes as being appropriate to the physique, yet refuse to assign the negative evaluation to themselves. It would be apparent that these children are unable to recognize the similarity between their physique and those representing overweight or endomorphy. It also may be that the children ignore their their fatness problem, or they simply do not internalize these negative images.

From these findings in the literature on body image, speculation arose as to whether or not body cathexis, an aspect of body image, might reflect a similar response pattern. The children appear to incorrectly perceive their own body image. Since they may not realize they are overweight, or they acknowledge the condition but not within the context of a problem, the children may respond with a degree of body satisfaction congruent with those children who are free of the overweight problem. This may have been a reason for the results that occurred in this study. This area of fatness and body cathexis warrants further investigation. One target of such examination may involve assessment of the degree to which overfat children perceive themselves as being overfat, i.e., overfat or average fat, followed by an evaluation of body cathexis.

The relationship between movement satisfaction and fatness has received little attention in the literature. Movement satisfaction, however, has been related with self concept, with adolescent girls' participation in physical

activity, and with body cathexis (Butcher, 1980; Johnston, 1969).

TABLE 16: Chi-square values for movement satisfaction (fat 3=average, undesirable, overfat; fat 2=average, above average).

AGE	FAT	N	CHI-SQUARE	SIGNIFICANCE	ASSOCIATION (Cramer's V) (Phi)
9	3	32	2.201	.333	C .262
7	2	18	.595	----	P .189
9	2	32	1.358	.244	P .206
11	2	27	.167	.683	P .079

The lack of an association between fatness and movement satisfaction found in this study may be attributed to problems similar to those plaguing physical fitness and motor performance. The size of the sample may be too small to have reproduced the distribution of characteristics found in the population. Likewise, the level of fatness may not clearly distinguish those of handicapping levels of fatness due to the proximity of the fatness level boundaries. If the sample consisted primarily of subjects posessing a positive predisposition toward physical activity that has been translated into active involvement, it is likely that these individuals would be satisfied with their movement abilities. Another reason for the results may be that children have not thought about their satisfaction or dissatisfaction with their movement abilities.

Movement satisfaction has been correlated, in the literature, with body cathexis. Since body cathexis, in this

study, was not significantly different among the fatness levels, it might then follow that movement satisfaction would display a similar response pattern.

<u>Child's Attitude Toward Physical Activity</u>

Seven subdimensions of physical activity were examined through two study designs. The chi-square analysis of the data did not reveal any significant associations between the three levels of fatness and the attitude toward physical activity in girls nine years of age. Similar results were found with seven and nine year old girls of average and above average fatness, as well as for attitudes toward five subdomains of physical activity professed by the eleven year old girls. In all of these cases, physical activity for thrill and risk consistently received negative attitude evaluations, while the other subdimensions were assigned positive attitudes. Two of the physical activity subdomains produced significant chi-square values for the eleven year old girls of average and above average fatness. A girl's value on fatness was significantly associated with the case's value on attitude toward physical activity as an aesthetic experience and for the release of tension. The above average fat eleven year old girls consistently indicated statistically significant negative responses to these subdimensions, whereas the average girls professed statistically significant positive attitudes.

TABLE 17: Chi-square values for children's attitude toward physical activity by fatness while controlling for age (nine years). (See appendix G for variable definitions.)

VARIABLE	N	CHI-SQUARE	SIGNIFICANCE	ASSOCIATION (Cramer's V)
CATPASE	30	.669	.716	.149
CATPAHF	30	1.353	.508	.212
CATPATR	29	.114	.945	.063
CATPAAE	30	.666	.717	.149
CATPACA	30	1.963	.375	.256
CATPATA	30	.427	.808	.119
CATPACO	30	2.411	.299	.283

TABLE 18: Chi-square values for children's attitudes toward physical activity by fatness while controlling for age (seven, nine and eleven years). (See appendix G for variable definitions).

VARIABLE	AGE	N	CHI-SQUARE	SIGNIFICANCE	ASSOCIATION (Cramer's V) (Phi)
CATPASE	7	18	.595	----	P .189
	9	32	.169	.169	C .073
	11	27	2.807	.246	C .322
CATPAHF	7	18	.595	----	P .189
	9	32	1.384	.501	C .208
	11	27	.714	.398	C .163
CATPATR	7	18	2.571	.277	C .378
	9	32	.161	.923	C .071
	11	27	3.085	.214	C .338
CATPAAE	7	18	.595	----	C .189
	9	32	.664	.717	C .144
	*11	27	7.231	.027	C .518
CATPACA	7	18	.748	.688	C .204
	9	32	1.693	.429	C .23
	*11	27	5.876	.053	C .466
CATPATA	7	18	3.273	.195	C .426
	9	32	.395	.821	C .111
	11	27	.749	.687	C .167
CATPACO	7	18	1.469	.479	C .286
	9	32	1.669	.434	C .228
	11	27	.714	.398	C .163

* $p < .053$

Once again, these results may have been affected by the sampling procedure. The sample size was small and

potentially not truly representative of the population. The problem with the fatness categories not being polarized would also have affected the results. The possibility that only those interested in physical activity joined the study would greatly influence the results of the study, with particular reference to the child's attitude toward physical activity. The children volunteering may already possess a positive predisposition toward physical activity which may have been their reason for joining the study. If this occurred, it would greatly bias the results of the study.

The findings of favourable attitude toward physical activity, regardless of age and fatness, is similar to the implications of a study by Bullen, et al. (1963). In that study, obese adolescent girls professed positive attitudes toward physical activity, yet were less physically active than the nonobese adolescents. These subjects were involved in a summer weight reduction camp and their attendance may not have been guided by their attitude toward physical activity, which may have been the case in subjects volunteering for the present investigation. It may be that active involvement in physical activity does not necessarily follow the expression of a positive attitude toward physical activity. This assumption, however, may not apply to the present study where sampling may have biased the results.

Bullen, et al. (1964) discovered that adolescent obese and nonobese girls participate in physical activity for the social experience it offers. The findings of the present

study coincide with these results. Each age group and each fatness level tended to reflect a positive attitude toward this subdimension of physical activity.

Children's attitude toward other physical activity realms were found to be related to adolescent girls' participation in physical activity as found in Butcher's (1980) study. Attitude toward physical activity as long and hard training and for competition were signficantly and positively related to these girls' participation level. In the present study, the girls of all ages and fatness levels indicated positive attitudes toward these same two subdimensions of physical activity. It may be that the obese children reflect the positive attitudes, but whether or not these attitudes lead to physical action may not be determined within the scope of the present study.

One significant finding indicated that fatness affected eleven year old girls' attitude toward physical activity for the release of tension. Girls of above average fatness responded with a negative attitude toward this physical activity category. Obese children have been found to be less physically active than their nonobese counterparts. They have been found not to respond spontaneously with activity-oriented ideas when directed ambiguous questions or scenarios (Bullen, et al., 1963). Consequently, this lack of attention surrounding physical activity may negate the possibility of obese children spontaneously highlighting physical activity as a method for releasing tension. They

would probably elect a mode of expression consistent with their normal lifestyle pattern. A confounding factor may have been that they do not know what tension means. This factor was not investigated within the present study.

Another finding was the significant association between fatness and physical activity as an aesthetic experience for eleven year old girls. Preadolescence and adolescence are times when an individual's attention is often focussed on the appearance of the body. This age group, more than the younger children, may be aware of obesity in the context of a problem. Consequently, the older children may be more susceptible to the pressures of society's negative attitude toward obesity. The result may be that above average fat girls would tend to shy away from activities that focus on the beauty of human movement, hence the negative attitude expressed toward physical activity as an aesthetic experience.

In the study by Bullen, et al. (1964), similar reasons may apply to their results. The overweight adolescent girls did not like to participate in swimming activities. One might speculate as to whether this opinion was based on these girls' perceptions of their appearance while clad in swimming suits rather than being based on the actual swimming activity.

Parental Socialization Influence

Within the boundaries of the present study, parental socialization influence was evaluated through the assessment

of parents' attitude toward their own and toward their daughter's physical activity participation, and the child's perception of parental encouragement to participate in physical activity. The results of the chi-square analysis revealed that no significant associations existed between daughter's level of fatness and parents' attitude toward their own or toward their daughter's physical activity for seven year old girls. The results, however, indicated significant associations between daughter's fatness and parents' attitude toward selected physical activity subdimensions for nine and eleven year old girls.

TABLE 19: Chi-square values for mothers' attitudes toward physical activity by fatness while controlling for age (nine years). (See appendix G for variable definitions.)

VARIABLE	N	CHI-SQUARE	SIGNIFICANCE	ASSOCIATION (Cramer's V)
MATPASE	32	1.499	.472	.217
MATPAHF	32	.864	.649	.164
MATPATR	32	5.236	.073	.405
MATPAAE	32	.552	.759	.131
MATPACA	32	1.758	.415	.234
MATPATA*	32	6.504	.039	.451
MATPACO	32	4.453	.108	.373
MATDPASE	32	.152	.927	.069
MATDPAHF	32	.495	.781	.124
MATDPATR	32	1.778	.411	.236
MATDPAAE	32	.152	.927	.069
MATDPACA	32	.139	.933	.066
MATDPATA	32	.364	.834	.107
MATDPACO	32	1.259	.533	.198

* p < .05

TABLE 20: Chi-square values for mothers' attitudes toward physical activity by fatness while controlling for age (seven, nine and eleven years). (See Appendix G for variable definitions.)

VARIABLE	AGE	N	CHI-SQUARE	SIGNIFICANCE	ASSOCIATION (Phi)
MATPASE	7	18	.701	----	.033
	9	32	1.054	.305	.181
	11	27	.054	.816	.045
MATPAHF	7	18	.485	----	.152
	9	32	.372	.542	.108
	11	27	.007	.930	.016
MATPATR	7	18	.617	----	.059
	*9	32	4.072	.044	.357
	11	27	.564	.453	.145
MATPAAE	7	18	.554	----	.119
	9	32	.550	.458	.131
	11	27	.077	.782	.050
MATPACA	7	18	.555	----	.189
	9	32	.117	.732	.060
	11	27	.076	.782	.053
MATPATA	7	18	.670	----	.030
	9	32	.650	.419	.143
	11	27	.404	.525	.122
MATPACO	7	18	.515	----	.122
	9	32	.019	.888	.020
	11	27	.490	.480	.135
MATDPASE	7	18	.299	----	.265
	9	32	.030	.850	.033
	11	27	.564	.453	.145
MATDPAHF	7	18	.673	----	.036
	9	32	.372	.540	.108
	11	27	.003	.950	.011
MATDPATR	7	18	.162	----	.378
	9	32	1.659	.198	.228
	11	27	.007	.930	.017
MATDPAAE	7	18	.670	----	.035
	9	32	.034	.854	.033
	11	27	.404	.525	.122
MATDPACA	7	18	.405	----	.236
	9	32	.002	.961	.009
	11	27	.404	.525	.123
MATDPATA	7	18	.778	----	.129
	9	32	.249	.618	.088
	11	27	.564	.453	.145
MATDPACO	7	18	.595	----	.189
	9	32	.709	.399	.149
	11	27	.404	.525	.122

$* \ p < .05$

TABLE 21: Chi-square values for fathers' attitudes toward physical activity by fatness while controlling for age (nine years). (See Appendix G for variable definitions.)

VARIABLE	AGE	CHI-SQUARE	SIGNIFICANCE	ASSOCIATION (Cramer's V)
FATPASE	32	4.263	.119	.365
FATPAHF	32	3.276	.194	.319
FATPATR	32	1.669	.434	.228
FATPAAE	32	4.034	.133	.355
FATPACA	32	2.536	.282	.281
FATPATA	32	.165	.921	.072
FATPACO	32	1.286	.526	.200
FATDPASE*	32	7.087	.029	.471
FATDPAHF	32	4.034	.133	.355
FATDPATR	32	5.152	.076	.401
FATDPAAE	32	2.536	.282	.281
FATDPACA	32	2.908	.234	.301
FATDPATA	32	4.263	.119	.365
FATDPACO	32	1.669	.434	.228

* $p < .05$

TABLE 22: Chi-square values for fathers' attitudes toward physical activity by fatness while controlling for age (seven, nine and eleven years). (See Appendix G for variable definitions.)

VARIABLE	AGE	N	CHI-SQUARE	SIGNIFICANCE	ASSOCIATION (Phi)
FATPASE	7	18	.137	----	.396
	*9	32	3.802	.051	.345
	11	27	2.217	.137	.287
FATPAHF	7	18	.299	----	.265
	9	32	2.815	.093	.297
	11	27	2.829	.923	.324
FATPATR	7	18	.083	----	.427
	9	32	.650	.419	.143
	11	27	2.216	.137	.287
FATPAAE	7	18	.407	----	.189
	9	32	3.029	.082	.308
	11	27	1.917	.166	.267
FATPACA	7	18	.137	----	.396
	9	32	1.499	.221	.216
	11	27	1.394	.238	.227
FATPATA	7	18	.197	----	.357
	9	32	.002	.957	.009
	11	27	.939	.332	.187
FATPACO	7	18	.407	----	.189
	9	32	.794	.373	.158
	11	27	2.739	.098	.319
FATDPASE	7	18	.407	----	.189
	*9	32	4.265	.039	.365
	*11	27	3.755	.053	.373
FATDPAHF	7	18	.407	----	.185
	9	32	3.029	.082	.308
	11	27	1.395	.238	.227
FATDPATR	7	18	.083	----	.472
	9	32	2.330	.127	.269
	11	27	2.829	.093	.324
FATDPAAE	7	18	.137	----	.396
	9	32	1.499	.221	.216
	11	27	2.217	.137	.286
FATDPACA	7	18	.108	----	.478
	9	32	.709	.399	.149
	11	27	2.739	.098	.319
FATDPATA	7	18	.137	----	.396
	*9	32	3.802	.051	.345
	*11	27	4.909	.027	.426
FATDPACO	7	18	.137	----	.396
	9	32	.653	.419	.143
	*11	27	3.913	.048	.381

* $p < .053$

The results implied that no significant association existed between any of the realms of parents' attitude and daughter's fatness classification for girls seven years of age. Parents may perceive that physical activity is an integral component of childhood and that their child's level of fatness is not relevant within this context. In fact, the parents may not perceive their daughter's fatness, in the case of above average fat, as being a problem or that if it is a problem, the child will shortly outgrow it. If the latter is the case, the parents may believe that physical activity participation may help the problem and may even reverse the condition. This may account for the lack of a significant difference in parents' attitude among the fatness levels, i.e., average fat and above average fat girls receive similar amounts of encouragement to participate in physical activity, and that the above average fat group is not handicapped by negative parental attitudes.

Unlike seven year old girls, nine year olds exhibited significant chi-square values in both study designs. Where three levels of fatness were utilized, a statistically significiant association existed between daughter's level of fatness and mother's attitude toward physical activity as long and hard training. Of the overfat classification, all of the mothers professed positive attitudes, whereas 50% of the undesirable fat level and 71% of the average fat class indicated positive attitudes toward this subdomain of physical activity. Parental participation in physical

activity has been associated with the likelihood of child's involvement (Snyder and Spreitzer, 1976; Kennedy, 1975; Orlick, 1972). Bullen, et al. (1963) found that parents of obese and nonobese adolescent girls expressed similar degrees of involvement in physical activity. The activity level of the mothers was not examined in the present study. It was not determined whether this attitude was truly related with the child's fatness, or that females not actively involved in sport show a less than favorable attitude toward physical activity as long and hard training.

The absence of significant associations between daughter's level of fatness and mother's attitude toward daughter's physical activity participation, of which strenuous activities in the form of long and hard training was an example, were partially congruent with the study by Johnson, et al. (1956). These authors reported no significant difference between the parents of obese and nonobese adolescent girls with respect to physical activity as strenuous exercise for their daughter. Mothers of the above average fat girls in the present study may or may not recognize that their daughter's fatness is a problem. If they perceive that a problem exists, the mothers may turn toward physical activity participation for their daughter as one mechanism of alleviating the condition.

For nine year old girls and three levels of fatness, father's attitude toward physical activity as a social experience for their daughter was found to be significantly

associated with the daughter's fatness classification. All fathers expressed a positive attitude, but all those in the undesirable category and 58.3% at the overfat level responded with only a "positive" attitude toward this subdomain rather than with a "more positive" attitude. Parents in the average fat category revealed a "more positive" attitude (64.3%). Whether or not the relative lack of encouragement to participate on the part of the fathers in the above average fat classification was based upon overprotection was not analyzed in the present study. It may be that these fathers would like the child to participate, yet recognize that peer pressure against excessive fat may be painful to the child.

When undesirable fat and overfat are amalgamated into one category labelled above average fat, the results proved to be slightly different. Four realms of attitude were found to be signficantly associated with daughter's level of fatness. These included the following: mother's attitude toward physical activity as thrill and risk, father's attitude toward physical activity as a social experience, and father's attitude toward daughter's physical activity as a social experience and as long and hard training.

The majority (83.7%) of the mothers in the above average fat category responded with a positive attitude toward physical activity as a thrill and involving risk, whereas only 50% of the mothers at the average fat level responded with a positive attitude toward this subdimension

of physical activity. The relationship between this attitude and the type of activity these mothers encourage their daughters to participate in, however, may provide interesting observations.

Father's attitude toward physical activity as a social experience for himself and for his daughter were both significantly associated with daughter's fatness level. With reference to the former, 78.6% of those in the average fat category responded positively, but only 44.4% of those at the above average fat level replied in a positive manner. On the other hand, father's attitude toward physical activity as a source of social experience for the daughter was found to be positive in all fatness categories. The category of more positive attitude accounted for 64.3% of those at the average fat level, whereas only 27.8% of those in the above average fat class responded with the category indicating a more positive attitude. Whether the differences in responses to attitude toward self and daughter in this respect was based on what they feel to be socially acceptable for themselves and then for their daughters was not investigated within the confines of the present study.

Finally, in the nine year old category with two fatness classifications, father's attitude toward physical activity as long and hard training for the daughter was found to be significantly associated with daughter's level of fatness. In the average fat category, 78.6% responded positively, while only 44.4% at the above average fat level indicated a

positive attitude. Two possibilities for the occurrence of these results may be that fathers of the above average fat girls may think that this mode of physical activity is too strenuous for their daughter's physical condition, or that it is an unacceptable form of activity for girls. It is obvious that the latter is not likely the case for those in the average fat level, and whether or not it may apply to the fathers of girls posessing more fat was not investigated.

Proceeding to the older girls, significant associations were found between daughter's level of fatness and three subdomains reflecting father's attitude toward daughter's physical activity participation in eleven year old girls. These subdimensions included physical activity as a social experience for the daughter, as long and hard training for the daughter, and as competition for the daughter.

All fathers responded positively to physical activity as a social experience for their daughters. In the average fat category, 43.6% of the fathers replied with a more positive attitude, while only 9.1% of those in the above average fat class were this enthusiastic. It may be that fathers of above average fat girls recognize the social importance of events at this particular age, but they also perceive the possibility of peer rejection to the condition of excessive body fat.

Physical activity as long and hard training and as competition for the daughter received negative responses

from fathers. In the average fat category, 50% responded negatively while, 90.9% in the above average fat class indicated a negative attitude toward physical activity as long and hard training for the daughter. With respect to competition for the daughter, the corresponding figures were 43.7% and 81.8% responding negatively to this subdimension. The fathers in the above average fat classification may feel that their daughter's physical condition may be of a handicap in these two pursuits. With reference to training, the father may think it to be too strenuous for the daughter. For competition, the father may think that the daughter may be handicapped and that such failure may inflict psychological damage to the child, particularly if repeated often enough. Whether or not these attitudes are reflective of the father's belief that the pursuit of physical activity within these two contexts is not appropriate to girls in general or just the daughter in particular was not established within the boundaries of the present study.

TABLE 23: Chi-square values for children's (nine years and three fatnesses) perception of parental encouragement. (See Appendix G for variable definitions.)

VARIABLE	N	CHI-SQUARE	SIGNIFICANCE	ASSOCIATION (Phi)
CPPEF	32	3.463	.178	.329
CPPEM	32	.508	.776	.129

TABLE 24: Chi-square values for children's (seven, nine and eleven years and two fatness levels) perception of parental encouragement. (See Appendix G for variable definitions.)

VARIABLE	AGE	N	CHI-SQUARE	SIGNIFICANCE	ASSOCIATION (Phi)
CPPEF	7	18	.446	----	.239
	9	32	.231	.631	.085
	11	27	.939	.332	.187
CPPEM	7	18	.446	----	.239
	9	32	.326	.568	.101
	11	27	.714	.398	.163

The child's perception of parental encouragement was not statistically significantly associated with level of fatness. Most children, regardless of age or fatness, indicated high levels of parental encouragement to participate in physical activity. These results coincide with those of Bullen et al. (1963) where it was revealed that obese and nonobese adolescent girls received similar levels of encouragement to participate in physical activity from parents. The fact that both parents were perceived to express high levels of encouragement does not reveal whether or not it was the father or the mother who exerted the greater influence. Snyder and Spreitzer (1973) indicated a tendency for the like-sexed parent to have more influence on the child's involvement in physical activity than did the opposite-sexed parent. Kennedy (1975) reported that physically active mothers were in a position of greater influence than fathers with respect to affecting daughter's physical activity participation. Watson (1975) found that

girls were more concerned with pleasing their mothers than their fathers through the vehicle of winning in athletics. Contrary to these findings, Greendorfer and Lewko (1978) discovered that the father was the most influential parent affecting daughter's participation in physical activity. Although the degree of influence has not been determined consistenty within the present study or in the literature, it was important to establish whether or not parents were perceived as encouraging physical activity participation. It is suggested that further investigation be directed toward determining the degree of influence exerted by each parent.

Correlation among Parents' Attitudes

The parental socialization variables found to be significantly associated with the child's fatness were examined using Pearson product-moment correlation coefficients. From this statistic, the type and strength of the linear relationship between pairs of these variables was determined. Caution should be exercised when interpretting the results because of the small number of cases involved.

For nine year old girls of average fatness, few significant correlations existed between mother's attitude toward her own and toward her daughter's physical activity participation. This inconsistency in response may be representative of a double standard, i.e., that the attitude the mother projects of herself is not necessarily transferred to her attitude toward her child's physical activity participation.

TABLE 25: Pearson product-moment correlation with significant chi-figure for nine years and average fatness. (See Appendix G for variable definition.)

SIGNIFCANT CHI-SQUARE VARIABLE	VARIABLE	COEFFICIENT	CASES	SIGNIFICANCE
MATPATR	MATDPAAE	-.6028	9	.043
FATPASE	MATDPAAE	.9002	9	.000
	FATPAHF	.7434	11	.004
	FATPAAE	.7038	11	.003
	FATPACA	.6770	11	.011
	FATPATA	.5331	11	.046
	FATDPASE	.8861	11	.000
	FATDPAAF	.8277	11	.001
	FATDPAAE	.7632	11	.003
	FATDPACA	.7901	11	.002
	FATDPACO	.6531	10	.020
FATDPASE	MATPACO	-.6118	9	.040
	MATDPAAE	.6982	9	.018
	MATDPACO	.5985	9	.044
	FATPAHF	.7316	11	.005
	FATPATR	.5749	11	.032
	FATPAAE	.8998	11	.000
	FATPACA	.8548	11	.000
	FATDPAHF	.8346	11	.001
	FATDPAAE	.7951	11	.002
	FATDPACA	.7123	11	.007
FATDPATA	MATDPACA	.6160	9	.039
	FATPATA	.8784	11	.000
	FATPACO	.6400	10	.023
	FATDOAAE	.6171	11	.022
	FATDPACA	.5571	11	.038
	FATDPACO	.7462	10	.007

TABLE 26: Pearson product-moment correlation with significant chi-square for nine years and above average fatness. (See Appendix G for variable definitions.)

SIGNIFICANT CHI-SQUARE VARIABLES	VARIABLE	COEFFICIENT	CASES	SIGNIFICANCE
MATPATR	MATPACA	.6134	15	.008
	MATDPATR	.8037	15	.000
	FATPASE	.6378	9	.032
FATPASE	FATPAHF	.5836	9	.050
	FATPATA	.7903	9	.006
	FATDPAHF	.6400	9	.032
	FATDPAAE	.6131	9	.040
	FATDPACA	.8523	9	.002
	FATDPATA	.7263	9	.013
FATDPASE	MATDPATA	-.7902	7	.017
	FATPAHF	.7256	9	.013
	FATPAAE	.7503	9	.010
	FATDPAHF	.8972	9	.001
	FATDPAAE	.6107	9	.040
	FATDPACA	.5899	9	.047
	FATDPACO	.6276	9	.035
	MNFIT	-.6706	9	.024
FATDPATA	MATPACO	-.7042	9	.017
	MATDPATA	.6770	7	.047
	FATPATA	.8544	9	.002
	FATDPACA	.6873	9	.020

TABLE 27: Pearson product-moment correlation with significant chi-square for eleven years average fatness. (See Appendix G for variable definition.)

SIGNIFICANT CHI-SQUARE VARIABLE	VARIABLE	COEFFICIENT	CASES	SIGNIFICANCE
FATDPASE	MATPASE	.6638	8	.036
	MATPAAE	.7149	9	.015
	MATDPASE	.7379	8	.018
	MATDPAHF	.5852	9	.049
	MATDPAAE	.6556	9	.028
	MATDPATA	.7920	9	.005
	MATDPACO	.5914	9	.047
	FATPASE	.8489	9	.002
	FATPAAE	.9327	9	.000
	FATDPAHF	.6801	9	.022
	FATDPATR	.6618	9	.026
	FATDPATA	.8380	9	.002
	FATDPACO	.6694	9	.024
FATDPATA	MATPASE	.6607	8	.037
	MATPAAE	.8264	9	.003
	MATDPATA	.7706	9	.008
	FATPASE	.6690	9	.024
	FATPAAE	.6889	9	.020
	FATDPASE	.8380	9	.002
	FATDPACO	.6077	9	.041
FATDPACO	MATPASE	.6960	8	.028
	MATPAHF	.7420	9	.011
	MATDPAHF	.7322	9	.012
	MATDPACO	.5913	9	.047
	FATPASE	.7895	9	.006
	FATPATR	.7279	9	.013
	FATPAAE	.6166	9	.038
	FATPATA	.6665	9	.025
	FATPACO	.8267	9	.003
	FATDPASE	.6694	9	.024
	FATDPAHF	.7649	9	.008
	FATDPATR	.8177	9	.004
	FATDPACA	.7146	9	.015
	FATDPATA	.6077	9	.041

TABLE 28: Pearson product-moment correlation with significant chi-square for eleven years and above average fatness. (See Appendix G for variable definition.)

SIGNIFICANT CHI-SQUARE VARIABLE	VARIABLE	COEFFICIENT	CASES	SIGNIFICANCE
FATDPASE	FATPASE	-.9985	3	.018
	FATPATR	.9982	3	.019
FATDPATA	(N was too small, SPSS did not compute statistics)			
FATDPACO	MATPAHF	.9992	3	.013
	MATPAAE	.9958	3	.029
	MATPACA	.9992	3	.013
	MATDPASE	.9998	3	.006
	MATOPAHF	.9933	3	.037
	MATDPAAE	.9992	3	.013
	FATPAHF	.9996	3	.009
	FATPACA	.9981	3	.020

For this age and fatness classification, a significant negative correlation existed between mother's attitude toward physical activity as thrill and risk, and mother's attitude toward physical activity as an aesthetic experience for her daughter. Kennedy (1975) suggested that physically active mothers encourage and provide opportunities for daughter's physical activity participation that are often congruent with mother's activity selection. Since mothers favoured activities involving thrill and risk, the type of opportunities presented to daughter may illustrate this maternal attitude.

With respect to fathers in this age and fatness group, attitudes toward their own and toward their daughter's physical activity participation were significantly correlated on several accounts. Examples of the most significant findings with respect to father's attitudes were

the relationships between the various subdimensions of physical activity as they apply to the father's attitude toward daughter's participation. The physical activity subdomains included the father's attitude toward physical activity as long and hard training, as an aesthetic experience, as a mode of tension release, as well as for the daughter's competition. These results may indicate that the father may possess well defined attitudes that apply to himself and to his daughter. These findings were contrary to those referring to maternal attitudes where there were few significant associations between mother's attitude toward her own and toward her daughter's participation. From this occurrence, it may be suggested that the possibility of the father being influential with regard to daughter's participation exceeds that of the mother. It may be that fathers project a stronger attitude toward the topic of female physical activity participation than do the mothers. Parents have been found to exert a socializing influence on children's physical activity participation. It may be suggested that the parent presenting the most consistent and well defined attitudes would be the one to exert the greatest influence.

In the category of nine years and average fatness, mother's and father's attitudes toward their own and toward their daughter's physical activity were seldom significantly correlated. This difference illustrates an environment in which the child may be exposed to a variety of parental

influences that are the manifestations of the different attitudes. The degree of this influence and the establishment of the parent most affecting child's physical activity participation requires further study.

When examining the correlations among parental attitudes toward physical activity for nine year old girls of above average fatness, the results prove to be quite similar to those found in the average fatness category. Mother's attitudes toward her own and toward her daughter's physical activity were inconsistent, as were the relationships between mother's and father's attitudes. Again, father's attitudes appeared to elicit more frequent correlations. These results illustrate an environment in which the child is exposed to inconsistent and possibly opposing attitudinal influences. In such an environment, the parent exhibiting the most consistent views may prove to exert the most influence, regardless of parent's sex.

In examining the data analysis of eleven year old girls, father's attitude toward his own and toward his daughter's physical activity implied consistent behavioral predispositions for both average fat and above average fat children. There were no significant chi-square values associating mother's attitudes with daughter's level of fatness, consequently, these attitudes were not examined using the Pearson product-moment correlation procedure.

The parents of the eleven year old girls exhibited a greater degree of association between father's and mother's

attitudinal variables than did the parents of the younger children. It may be suggested that as the child grows older, the parents consolidate their predispositions toward their daughter's physical activity. An effect of this occurrence may be the formation of a common attitudinal atmosphere with which to influence the child. These findings were less consistent with reference to the above average fatness level. Consequently, these children may be exposed to a less well defined attitudinal atmosphere. In this case, parental influence may not be as substantial as may be possible when the attitudes are congruent.

C. General Discussion

The variables examined in the present study were selected because of their relationship to childhood obesity as implied through the related literature or on the basis of intuition. The results accruing from this examination indicated few direct associations between these variables and level of fatness.

When physical fitness and motor performance were each investigated as overall measurements, the results were contrary to the literature reporting relationships between childhood obesity and these variables. The results, however, indicated statistically significant relationships between these variables and the age and fatness classifications when the performance results were examined item by item.

With reference to the physical fitness items, sit ups, flexed arm hang, and the fifty meter run were found to be significantly inversely related to fatness level, i.e., as fatness level increased, the performance level decreased. The present findings support the results of previously conducted research which indicated that an increased proportion of body fat negatively affected performance in activities requiring movement of the whole body through space.

The performance on the jump and balance (left foot) was also found to be significantly inversely related to fatness level, a finding supported by Henderson and Stott (1977). The inability of the overfat children to vertically project their body weight may have been associated with the relative proportion of body fat as compared to lean body mass. The increased proportion of body fat exceeded the ability of the lean tissue to project the body against gravity. In cases where the child was able to successfully jump over the string, it usually required an extreme effort that may have disrupted the child's ability to maintain her balance upon landing. These performances illustrated the symbiotic nature of physical fitness and motor performance. The overfat children did not have the strength required to successfully complete the motor task.

All eight motor performance items were found to be significantly related to the age of the child. The older girls achieved greater success while performing the task

than the younger girls. These findings illustrated the role of motor development, as reflected by age, in the performance of specific motor tasks. For example, in the "catch off the wall" item, the nine and eleven year old girls completed a significantly greater number of catches than the seven year old girls. Likewise, the eleven year old girls achieved greater success with catching than the nine year old girls.

Child's attitude toward physical activity was not significantly associated with fatness level, except with respect to physical activity as an aesthetic and as a cathartic experience for eleven year old girls. Obese adolescents have been noted to respond less frequently with activity-oriented replies when directed ambiguous questions and scenarios (Bullen, et al., 1963). Consequently, it is not likely that the child would spontaneously select physical activity as a mode for tension release. Likewise, the finding pertaining to the aesthetics factor reflects common sense. The above average fat physique is not conducive to being focussued upon through physical activities emphasizing the beauty in human movement, particularly during preadolescence when attention by the self and by others is directed toward appearance. For the other subdimensions of physical activity, the sample, regardless of age or fatness, indicated a tendency to respond with a positive predispostion toward physical activity, except in the case of physical activity for thrill

and risk. This aspect consistently provoked negative evaluations.

Parents' attitude toward physical activity for themselves and for their daughters produced inconsistent results. A few of these attitudes were related to level of daughter's level of fatness. The literature supports the notion that parents serve as influential socializing agents during childhood (Greendorfer and Lewko, 1978; Greendorfer, 1977; Snyder and Spreitzer, 1976; Balaza, 1975; Kennedy, 1975; Snyder and Spreitzer, 1973). It may then be likely that the discrepancy between attitudes based on daughter's fatness may affect the child's socialization into physical activity participation.

Father's, more than mother's, attitude proved to be related with fatness level at nine years, and also revealed a greater number of significant correlations between attitude toward his own and toward his daughter's physical activity. At eleven years of age, attitude and fatness were related on selected subdomains of physical activity. Father's attitudes had a tendency toward more correlations with mother's attitudes. It may be that during their daughter's preadolescence, the parents formulate definite opinions about their child's participation pattern and exert a common front that may prove to be more influential with respect to child's behavioral predisposition toward physical activity. It may be suggested that the greater the level of attitudinal consistency, the greater may be the influence

exerted by the one professing the consistent views. For these children, the father would meet this qualification. Results in the literature have not been conclusive, with the father and the mother each being most influential in various studies. Also, much of the literature has been concerned with the socialization of children into the role of athlete rather than into general physical activity participation.

Parents' attitudes and those of the children were not congruent. The child's attitudes that were associated with fatness were not necessarily the same subdomains found to elicit significant associations between parental attitude and daughter's fatness. This finding would question the degree of influence exerted through parental attitudes toward physical activity. This perspective warranted further consideration.

Child's perception of parental encouragement was not found to be significantly associated with level of fatness. The majority of children, regardless of age or fatness category, indicated high levels of parental encouragement. Since parents' attitudes were not consistently related with daughter's fatness classification, and the child perceived high levels of encouragement to participate in physical activity, an obvious discrepancy occurred. One reason may be that the parents' attitude is not necessarily translated into action that is perceived by the child as encouragement, or that encouragement is perceived even without evidence of a positive parental attitude.

CHAPTER FIVE

V. SUMMARY AND CONCLUSIONS

A. Summary

This study examined the relationships between selected variables and the age and fatness level of elementary school girls. The selected dependent variables included the following: physical fitness performance, motor performance, child's attitude toward physical activity, body cathexis, movement satisfaction, child's perception of parental encouragement, and parental attitude toward their own and toward their daughter's physical activity participation. These variables were incorporated since previous research had indicated their relationship to childhood obesity and physical activity.

Physical fitness performance was assessed utilizing the C.A.H.P.E.R. Fitness Performance II Test. Motor performance was determined through a test battery comprised of five items including four items from the Stott Test for Motor Impairment, and a modified version of Gubbay's clap and catch test. The children's attitude toward physical activity was assessed through a modification of Simon and Smoll's (1974) and Butcher's (1980) test instrument. Secord and Jourard's (1953) test of body cathexis and Nelson and Allen's (1970) movement satisfaction questionnaire were modified and administered to the children. As well, children's perception of parental encouragement was

evaluated through a modification of Butcher's (1980) instrument. Simon and Smoll's (1974) attitude toward physical activity inventory, with the addition of Butcher's (1980) seventh physical activity subdomain, was utilized to assess parental attitude toward physical activity. This questionnaire was then modified to ascertain parental attitude toward their daughter's physical activity participation.

Four study designs evolved from the data collection process. These study designs consisted of the following age and fatness classifications: nine years and three fatnesses; seven and nine years with two fatnesses; and seven, nine and eleven year old girls with two fatness levels. General observations, descriptive statistics, analysis of variance, chi-square, phi, Cramer's V, and Pearson product-moment correlation coefficients were employed for data analyses.

The statistical analysis of the data revealed some findings that were contrary to that reported in the literature. Sampling problems inherent in the study design, i.e., sample size and the possible nature of the subjects participating in the study, may have introduced confounding factors biasing the results of mean physical fitness performance, mean motor performance, and satisfaction with personal attributes. These variables were not found to be significantly associated with level of fatness. When physical fitness and motor performance were examined item by item, however, statistically significant relationships were

found between specific variables and the age and fatness classifications.

Other variables, including child's attitude toward specific physical activity subdomains, and some categories of parents' attitude toward their own and toward their daughter's physical activity participation, were found to be significantly associated with level of fatness. Some of these findings have been supported by previous literature.

B. Conclusions

From the results of this investigation of the relationships among physical performance, attitudes and fatness in young females, several conclusions have been generated. These conclusions were specific to the scope and limitations of the study design and should be interpreted within this context.

1. The following variables were found not to be significantly associated with child's level of fatness: mean physical fitness performance, mean motor performance, child's perception of parental encouragement, body cathexis, movement satisfaction, child's attitude toward physical activity except as an aesthetic and cathartic experience, and parents' attitude toward several subdimensions of physical activity with respect to themselves and their attitude toward their daughter's physical activity participation.

2. In girls nine years of age, performance on the jump and balance (left foot) was inversely related to level of fatness. The children exhibiting a greater proportion of body fat were unable to balance for a time period as long as those with a lower proportion of body fat.

3. For girls seven and nine years of age, performances on the following items were found to be directly related with age, i.e., the older children were better performers: sit ups, board balance (right foot), jump and balance (left foot), catch off wall, and clap and catch.

4. Seven and nine year old girls' performances on sit ups and jump and balance (left foot) were found to be inversely related to the level of fatness. The children exhibiting a greater proportion of body fat successfully completed fewer sit ups and were unable to balance as long as those with a lower proportion of body fat.

5. The following performance items were found to be directly associated with age level in girls seven, nine and eleven years of age: sit ups, stork balance (both feet), board balance (both feet), jump and balance (both feet), catch off wall, and clap and catch. The older girls elicited better performances than the younger girls.

6. The physical fitness items found to be significantly inversely related to fatness level in girls seven, nine and eleven years of age were the sit ups, fifty meter run, and the flexed arm hang. The girls exhibiting greater proportions of body fat executed fewer sit ups, ran slower

than, and could not suspend themselves as long as the children with a lower proportion of body fat.

7. Child's attitude toward the subdimensions of physical activity found to be significantly associated with child's level of fatness in eleven year old girls included: physical activity as the beauty in human movement and physical activity for the release of tension.

8. The components of parental socializing influence found to be significantly associated with daughter's level of fatness included the following for nine year old girls and the three degrees of fatness (average fat, undesirable fat, and overfat): mother's attitude toward physical activity as long and hard training and father's attitude toward daughter's physical activity as a social experience.

9. With respect to nine year old girls of the two fatness levels, representing average and above average fatness, the aspects of parental socializing influence significantly related with fatness included the following: mother's attitude toward physical activity as thrill and risk, father's attitude toward physical activity as a social experience, and father's attitude toward daughter's physical activity as both a social experience and as long and hard training.

10. The components of parental socializing influence found to be significantly related to daughter's level of fatness included the following variables for girls eleven years of age with the two fatness levels reflecting average

and above average fatness: father's attitude toward daughter's physical activity as a social experience, as long and hard training, and for competition.

C. Recommendations for Further Study

The whole area of physical activity and childhood obesity warrants further attention so that information leading to the successful prevention and/or treatment of the condition may be sought. The results of the present study illustrate possible recommendations for further investigation.

Sample Selection

The results of the present study highlighted potenial problems with the sampling technique utilized. Firstly, a greater number of subjects is required to obtain a sample truly representative of the population from which it was drawn. Personal contact with the parents of the selected children may produce a higher rate of compliance with respect to subject participation.

Secondly, the age groups should be expanded to include children from five through twelve years of age. This would supply information of a developmental nature whereby changes in the variables' status or influence may be noted as they occur. Also, the child's maturation level should be assessed to determine any possible influence it may have on the variables under consideration.

Thirdly, the method of fatness classification should employ divisions which tend to polarize the categories. For example, the same three fatness levels utilized in the present study could be refined to include those with fatness levels representing the mean, plus or minus one standard deviation. A technique such as this may eliminate the overlap of performance results paralleling fatness categories separated by a few millimeters of subcutaneous fat. Fatness classification should also be examined from the point of disability that it produces. This level may prove to be different for the introduction of physiological and psychosocial disabilities. For example, the social pressures of excessive fatness may become a problem prior to the fatness level inflicting harmful physiological adaptations.

Finally, the selection of the nature of the sample should be considered. When volunteers are utilized, it is probable that those granting permission to become subjects are the ones who possess some affinity for the nature of the study. In the present study, it was possible that only those interested in physical activity joined the study. This may bias the results by gaining information only from those possessing a positivepredisposition toward physical activity and are, in fact, more active. One way to avoid this problem may be to ask permission to test a large sample of students in the school system. Should the testing be incorporated as part of the yearly program, it may gain a greater degree of acceptance.

Variables

In order to address a multifaceted problem such as obesity in childhood, a multidisciplinary approach is suggested. With limitations, the present study attempted this type of an approach. The variables included in this investigation warrant further perusal with refinement of some to more accurately assess the parameters in question. For example, movement satisfaction and motor performance should consist of items reflecting culturally normative behaviors. Motor performance should be assessed within the context of the type and degree of handicap it produces, i.e., physical and/or social handicaps.

Since various components of parental socializing influence were found to be related with child's level of fatness, further study of these variables as well as those not found to be associated with the fatness variable should be considered. An insight into the actual influence of these variables on child's attitude toward and participation in physical activity necessitates a thorough examination of the relationships and factors influencing these associations.

Other inclusions to the list of variables would involve any other factors that have been found to be related to childhood participation in physical activity. These should then be approached from the perspective of childhood obesity. Once the influencing factors have been outlined, their relationships to one another should be determined. The results of such an investigation may provide information

leading to a comprehensive program aimed at the prevention and/or treatment of childhood obesity.

D. Implications of the Results

Although some of the results tended to be somewhat ambiguous, the original tenets upon which the study was conducted were supported by the literature. Obesity in childhood is a serious problem warranting considerable attention. Physical inactivity has been found to be an important etiological factor associated with childhood obesity. Because of its relationhip to the onset and progression of childhood obesity, physical activity should occupy a predominant position in the prevention and/or treatment of the condition. In order for the influence of the variable to be truly effective, an investigation of the factors related to childhood physical activity participation is required. Only after a thorough evaluation may the most influential components of childhood physical activity participation be incorporated as an integral segment of a program aimed toward the the onset and progression and/or the prevention or treatment of childhood obesity.

Acknowledging certain limitations, the present study was an elementary attempt at the aforementioned procedure. The results of the present study supported the findings of previously conducted research which indicated that certain aspects of physical fitness are negatively affected by an increased proportion of body fat. A physical activity

program aimed at the overfat child may benefit the physical fitness profile of the individual. Also, the emphasis of parental involvement in a program focussing on physical activity and directed toward childhood obesity cannot be overemphasized.

Parents play an influential role in the socialization of their child into physical activity participation. The present study produced evidence of a relationship between daughter's fatness and parents' attitude toward selected subdimensions of their own and toward their daughter's physical activity. The direction and degree to which these attitudes differ may influence the above average fat child's predisposition toward physical activity. The level and type of physical activity engaged in by the child may be associated with these parental attitudes. For example, when parents enjoy a particular physical activity and provide opportunities for their daughter to participate, the child may perceive these events as encouragement to partake in the same activity. The possibility of this set of relationships occurring emphasizes the potential importance of parental involvement in a program addressing childhood obesity though the realm of physical activity.

At the elementary school level, an example of such a program focussing on the physical activity component would be based upon the principle that education and the opportunity for practical experience are critical. This perspective may be simplistic, but it provides a basis from

which to commence programming. The program would be educational in nature employing components of evaluation, instruction, and guidance. It would be directed toward above average fat children and their parents, on a voluntary basis, through group and individual sessions. The program would follow specific phases that could be instituted on a yearly basis and modified to suit any grade level. It would be of vital importance to the success of the program that the child would have access to a follow-up program upon leaving elementary school. The treatment of obesity has to be of a long-term nature in order to produce significant and relatively permanent results.

Phase 1. This phase would involve a fitness week at school. It would serve to introduce the topic of fitness to the entire school. Included on one of these days would be "Fat Day" which focusses on the relationship between fatness and fitness. As a culmination of the weeks' events, parents would be invited to the school to listen to a lecture on fatness and fitness performed by the children.

Phase 2. Following the fitness week, the entire school population would undergo a fitness and fatness evaluation. These would be recorded and a copy given to the child as well as being kept on the school files.

Phase 3. An intramural activity would be designed to focus on various methods of improving all the components of fitness. Class competitions may evolve and be based upon overall fitness improvement rather than level of fitness

achieved.

Phase 4. Periodic fitness and fatness evaluations would be administered throughout the school year. Frequent examinations should be done during the winter months as these may be periods of reduced physical activity. The children may be more cognizant of the effect of inactivity if they can see the results of such evaluations.

Phases 1 through 6 could be implemented during a trial year or from January to June of the school year.

Phase 6. This phase would start in the new school year. Fitness week would be reinstated to remind the children and the parents of the program. Phase 1 through 5 could continue throughout the school year.

Phase 7. Through the most recent fitness and fatness evaluation, those with the problem of excessive fat would be identified.

Phase 8. Parents of these children would be contacted on an individual basis. The interview would commence with an assessment of the parents' attitude toward their own and toward their daughter's physical activity participation. The next step would involve an explanation of the purpose of the program and how it may benefit the child. Permission, if it is to be granted, would be obtained at this juncture.

Phase 9. Individual meetings would be scheduled with each of the children identified as potential program participants. A questionnaire assessing their attitude toward physical activity would be administered to the child.

Other tests evaluating personal attributes and other factors influencing physical activity participation would be assessed along with the attitude scale. The student would then be apprised of the purpose and content of the program.

Phase 10. A fitness club would be formulated involving the children with the fatness problem. Activities would focus on fitness improvement and proficiency in culturally normative activities. Periodic evaluations of fitness and fatness would be administered. Results would be given to the child, parents, and the school. The goal would be individual improvement rather than the level of fitness achieved.

Phase 11. Every two months, parents would be invited to review the fitness club activities. Individual assessments would be discussed with the parent. In December and June of each year, the parental attitude toward physical activity would be assessed to denote any alterations.

Phase 12. The fitness club members would compete intramurally with the evaluation based upon fitness/fatness improvement.

Phase 13. An annual fitness day, similar to a track and field meet, would be instituted in June. Parents would be invited and the whole school would participate. Included as part of the day's events would be an examination by the parents of records charting all of the students progress.

In order to thoroughly address the problem of childhood obesity, other agencies should be contacted to serve as guest lecturers to the children and parents. An example

would be a dietician who would relate nutrition with obesity. Ideally this individual should be available for individual consulting directed toward the parents and the child.

Childhood obesity is condition that requires thoughtful intervention. A transient program may have short term results, but the potential for success achieved to be converted into failure once the program is terminated is staggering. A child who experiences repeated failure may come to think that the problem is insurmountable. In fact, it is the program's failure to adjust to the real needs of the child. If society considers that the problem of childhood obesity warrants attention, provisions must be made whereby carefully planned programs can be made available to those in need.

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APPENDIX A

Letters, Consent Screening Forms

(Date)

(Principal)
(Address)

Dear (Principal):

I am a Physical Education graduate student at the University of Alberta. I am proposing a study that requires the utilization of elementary school age girls. Your school board has approved my study. They have directed me to contact the principals of the selected schools so that I may explain the requirements of the study.

This study involves the assessment of the physical fitness, motor performance, and attitude toward physical activity of obese and non-obese girls. It is hoped that the information collected would provide practical insight into the problem of childhood obesity. To this end, seven, nine, and eleven year old girls would be selected through skinfold measurements and then asked to participate in three testing sessions. Screening would be done in late January and early February. The first two testing sessions would take place in February and March, while the third would be administered in april. Each session would be approximately one hour in length and is dependent on the number of students involved in each session. Parental participation is a vital component of the study. They will be sent an explanation of the study and a questionnaire directed toward the assessment of their attitude toward physical activity. A report of this study will be available from your school board upon completion of the study.

I will be contacting you at a later date to obtain your response to my request. At that time, if possible, I would like to arrange a specific testing date for the screening process. Your cooperation in this matter would be greatly appreciated. Thank you.

Respectfully,

Jane L. Cameron
(home phone 434-0258)

Dear Parent/Guardian:

I am a Physical Education graduate student at the University of Alberta. I am initiating a study to assess the physical fitness, motor performance, and attitude toward physical activity of obese and non-obese girls. This study has been approved by the school board and the principal of your daughter's school.

YOur and your daughter's participation in this study would be greatly appreciated. Your daughter has been informed as to the nature of her involvement. She will be asked to participate in a physical fitness test, motor performance test, and answer a questionnaire about her attitude toward physical activity. Parental involvement includes the response to the enclosed questionnaire. Subject involvement in this study is voluntary and will be treated confidentially. It is hoped that the information obtained through this investigation will provide a practical insight into the problem of childhood obesity.

Should you decide that you and your daughter will participate in the study, please respond to the enclosed questionnaire and return it, via your daughter, to the school. The testing cannot be initiated unless parental involvement has been ensured. Please return the completed consent form along with the completed questionnaires should you allow your daughter to participate.

For further information, please contact your principal or myself (home phone 434-0258). Thank you for your prompt attention in this matter.

Respectfully,

Jane L. Cameron

CONSENT FORM

This form is to advise you that your daughter has been selected as a candidate for a study to be conducted at your daughter's school. The Edmonton Public School Board and the principal of the school have given their permission to try to select the subjects.

The study involves the assessment of physical fitness, motor performance and attitude toward physical activity. I would like to obtain your permission to perform four skinfold measurements (painless pinching of skin to assess the subcutaneous fat layer) on your daughter. The sites include two on the arm, on on the upper back, and one just below the "belly-button". These measurements will be done in private so as not to embarrass your child. These skinfold measurements are a part of the screening process to select subjects for the test.

Please complete this form and return it to your school's principal via your daughter. Your immediate reply is appreciated. Once the skinfolds have been assessed, a package will be sent home with your child to further explain the study and ask for parental cooperation in responding to a questionnaire.

I will allow my daughter ______________________________
(PRINT FULL NAME)
to participate in the screening process for this study. I understand the requirements of the four skinfold measurements and do not object to my daughter's participation.

Parent/Guardian ______________________________
(PRINT)

____
(SIGNATURE)

____
(DATE)

JANE CAMERON
U of A
Physical Education
Graduate Student
(home phone: 434-0258)

SCREENING FORM

NAME ______________________________

AGE ____________ (years)

SCHOOL ______________________________

GRADE __________

SKINFOLD MEASUREMENTS (millimeters)

SITE	TRIAL 1	TRIAL 2	TRIAL 3	AVERAGE
TRICEPS				
BICEPS				
SUBSCAPULAR				
SUPRAILLAC				
			SUM =	

CLASSIFICATION

_____ Average-FAT

_____ UNDESIRABLE-FAT

_____ OBESE

TABLE A1: Skinfold Measurement (mm) categories.

FATNESS CATEGORY	AGE	RANGE	PERCENTILE
Average	7	31.63 - 40.09	37.5 - 62.5
	9	31.63 - 40.09	37.5 - 62.5
	11	37.79 - 48.57	37.5 - 62.5
Undesirable	7	40.10 - 47.95	17.6 - 37.4
	9	40.10 - 47.95	17.6 - 37.4
	11	48.58 - 79.85	17.6 - 37.4
Overfat	7	47.96 - 66.68	0 - 17.5
	9	47.96 - 66.68	0 - 17.5
	11	79.86 - 112.15	0 - 17.5

CONSENT FORM

I will allow my child ______________________________
(PRINT CHILD'S FULL NAME)

to be included in this study involving the CAHPER fitness test, a test of motor performance, and the attitude toward physical activity questionnaire.

***PLEASE have your child return this form along with the COMPLETED questionnaire to her school's principal. Your EARLIEST consideration in this matter is appreciated.

PARENT/GUARDIAN ____________________
(PRINT NAME)

____
(SIGNATURE)

____
(DATE)

APPENDIX B

Study Designs and Skinfold Measurements

TABLE B1: Subjects' skinfold measurements (mm) and fatness categories.

FATNESS	AGE	N	RANGE	MEAN	STANDARD DEVIATION
Average	7	12	32.1 - 38.7	34.53	1.82
	9	13	30.6 - 39.2	34.77	2.85
	11	15	37.2 - 48.2	43.03	3.98
Undesirable	7	0	-----------	-----	----
	9	5	41.7 - 44.5	43.02	1.27
	11	11	47.9 - 73.7	56.05	7.22
Overfat	7	4	48.1 - 52.5	50.5	1.81
	9	12	48.3 -117.2	67.27	17.91
	11	0	-----------	-----	-----

TABLE B2: Chi-square and ANOVA study design - nine years, three fatness levels, number of subjects per cell, and mean skinfold measurement.

FATNESS	N	MEAN
Average	13	34.77
Undesirable	5	43.02
Overfat	12	67.27

TABLE B3: Chi-square study design - seven, nine and eleven years, two fatness levels, number of subjects per cell, and mean skinfold measurement.

FATNESS	AGE	N	MEAN
Average	7	12	34.53
	9	13	34.77
	11	15	43.03
Above average	7	4	50.50
	9	17	60.14
	11	11	56.05

TABLE B4: ANOVA study design - seven and nine years, two fatness levels, number of subjects per cell, and mean skinfold measurements.

FATNESS	AGE	N	MEAN
Average	7	12	34.53
	9	13	34.77
Overfat	7	4	50.50
	9	12	67.27

TABLE B5: ANOVA study design - seven, nine and eleven years, two fatness levels, number of subjects per cell, and mean skinfold measurements.

FATNESS	AGE	N	MEAN
Average	7	12	34.53
	9	13	34.77
	11	15	43.03
Above average	7	4	50.50
	9	12	67.27
	11	8	*58.63

* Subjects with the three lowest skinfold measurements in 11 years and undesirable fat removed to stretch the distance between the average and above average categories.

APPENDIX C

Parents' Questionnaire

PHYSICAL ACTIVITY QUESTIONNAIRE

DIRECTIONS: On the following pages are several boxes which contain different ideas. Down below the boxes are eight pairs of words. Mark these word pairs to show how you feel about the ideas.

What Does the Idea in the Box Mean to You?

PHYSICAL ACTIVITY AS A SOCIAL EXPERIENCE

Physical activities which give you a chance to meet new people and be with your friends.

Always Think About the Idea in the Box.

1. good ___:___:___:___:___:___:___: bad (8)
1 2 3 4 5 6 7

2. of no use ___:___:___:___:___:___:___:useful

3. not pleasant ___:___:___:___:___:___:___: pleasant (10)
1 2 3 4 5 6 7

4. bitter ___:___:___:___:___:___:___: sweet
1 2 3 4 5 6 7

5. nice ___:___:___:___:___:___:___: awful (12)
1 2 3 4 5 6 7

6. happy ___:___:___:___:___:___:___: sad
1 2 3 4 5 6 7

7. dirty ___:___:___:___:___:___:___: clean (14)
1 2 3 4 5 6 7

8. steady ___:___:___:___:___:___:___: nervous
1 2 3 4 5 6 7

Remaining Physical Activity subdomains
(same response technique)

PHYSICAL ACTIVITY FOR HEALTH AND FITNESS

Taking part in physical activities to make your health better and to get your body in better condition.

PHYSICAL ACTIVITY AS A THRILL BUT INVOLVING SOME RISK

Physical activities that are dangerous. They also can be exciting because you move very fast and must change directions quickly.

PHYSICAL ACTIVITY AS THE BEAUTY IN HUMAN MOVEMENT

Physical activities which have beautiful movements. Examples are ballet - dancing, gymnastics, tumbling and figure skating on ice.

PHYSICAL ACTIVITY FOR THE RELEASE OF TENSION

Taking part in physical activities to get away from problems you might have. You can also get away from problems by watching other people in physical activities.

PHYSICAL ACTIVITY AS LONG AND HARD TRAINING

Physical activities that have long and hard practices. To spend time in practice you need to give up other things you like to do.

PHYSICAL ACTIVITY FOR COMPETITION

Taking part in physical activities to compete against others - to do one's best and to try to win.

PARENTS' QUESTIONNAIRE ALTERATIONS

Terms

PATPA - Parents' Attitude Toward Physical Activity

PATDPA - Parents' Attitude Toward Daughter's Physical Activity

Ideas in Boxes

PATPA -Physical activity as a social experience: Physical activities which give you a chance to meet new people and be with your friends.

PATDPA -Physical activity as a social experience for your daughter: Physical activities which give your daughter a chance to meet new people and be with her friends.

PATPA -Physical activity for health and fitness: Taking part in physical activities to make your health better and to get your body in better condition.

PATDPA -Physical activity for your daughter's health and fitness: Taking part in physical activities to make your daughter's health better and to get her body in better condition.

PATPA -Physical activity as a thrill but involving some risk: Physical activities that are dangerous. They also can be exciting because you move very fast and must change

directions quickly.

PATDPA -Physical activity as a thrill but involving some risk to your daughter: Physical activities that are dangerous. They also can be exciting because she moves very fast and must change direction quickly.

PATPA -Physical activity as the beauty in human movement: Physical activities which have beautiful movements. Examples are ballet-dancing, gymnastics, tumbling, and figure skating on ice.

PATDPA -Your daughter participating in physical activity as the beauty in human movement: Physical activities which have beautiful movements. Examples are ballet-dancing, gymnastics, tumbling, and figure skating on ice.

PATPA - Physical activity for the release of tension: Taking part in physical activities to get away from problems you might have. You can also get away from problems by watching other people in physical activities.

PATDPA -Physical activity for the release of your daughter's tension: Taking part in physical activities to get away from problems she might have. She may also get away from problems by watching other people in physical activities.

PATPA -Physical activity as long and hard training: Physical activities that have long and hard practices. To spend time in practice you need to give up other things you like to do.

PATDPA -Physical activity as long and hard training for your daughter: Physical activities that have long and hard practices. To spend time in practice she needs to give up other things she likes to do.

PATPA -Physical activity for competition: Taking part in physical activities to compete against others - to do one's best and to try to win.

PATDPA -Physical activity as competition for your daughter: Taking part in physical activities in which your daughter competes against others - to do her best and to try to win.

APPENDIX D

Children's Questionnaire

NAME: ______________________________

AGE: ____________

GRADE: ____________

FAMILY INFORMATION

QUESTION	ANSWERS			
	Not Applicable Don't Know	Never	Sometimes	Often
3. How often do your parents participate with you in physical activity?				
a) Father	____	____	____	____
b) Mother	____	____	____	____
4. How often do your parents watch you participate in physical activity?				
a) Father	____	____	____	____
b) Mother	____	____	____	____
5. How often do your parents encourage you to participate in physical activity?				
a) Father	____	____	____	____
b) Mother	____	____	____	____
6. How often do your parents say that they wish you to be good in physical activities?				
a) Father	____	____	____	____
b) Mother	____	____	____	____

<u>DIRECTIONS</u>: Please read the question and answer by circling the number under the answer that tells me how you feel about <u>taking part or watching</u> physical activity (playing, games, sports, physical education classes).

<u>QUESTION</u>	<u>ANSWER</u> Really Dislike	Dislike	Like	Really Like
1. Do you like to take part in physical activities because you can be with your friends?	1	2	3	4
2. Do you like to take part in physical activity because it makes you healthy?	1	2	3	4
3. Do you like to take part in physical activity that is scary or dangerous?	1	2	3	4
4. Do you like to take part in activities that have beautiful movements (figure skating, ballet)?	1	2	3	4
5. Do you like to practice a physical activity when you have to give up other things you like to do?	1	2	3	4
6. Do you like to take part in physical activity to get away from your own problems?	1	2	3	4
7. Do you like to try your very hardest to win when you are playing games?	1	2	3	4

DIRECTIONS: Please circle the number under the answer that tells me how you feel about your body.

BODY PART	YOUR FEELINGS			
	Really Like	Like	Dislike	Really Dislike
Example: Fingernails	1	2	3	4
1. Height	1	2	3	4
2. Body-build (Thin, Average, chubby)	1	2	3	4
3. Face	1	2	3	4
4. Arms	1	2	3	4
5. Hands	1	2	3	4
6. Trunk (Part of body without arms, legs, head)	1	2	3	4
7. Waist	1	2	3	4
8. Hips	1	2	3	4
9. Legs	1	2	3	4
10. Feet	1	2	3	4
11. Weight	1	2	3	4
12. Sex (Whether you are girl or boy)	1	2	3	4

<u>DIRECTIONS</u>: Please circle the number under the answer that tells me how you feel about the way you are able to move your body in daily situations.

<u>MOVEMENT</u>	<u>YOUR FEELINGS</u>			
	Really Like	Like	Dislike	Really Dislike
Example: Ability to sit still.	1	2	3	4
1. Running for speed	1	2	3	4
2. Jump for height	1	2	3	4
3. Pick up or carry things without dropping them	1	2	3	4
4. Balance on one leg	1	2	3	4
5. Ability to do cartwheels and gymnastic stunts	1	2	3	4
6. Catch a ball	1	2	3	4
7. Jump to ground from height	1	2	3	4
8. Moving without feeling clumsy	1	2	3	4
9. Running for distance	1	2	3	4
10. Move to music	1	2	3	4
11. Kick a ball for distance	1	2	3	4
12. Skipping over a rope	1	2	3	4
13. Jumping for distance	1	2	3	4
14. Catching ball after clapping hands	1	2	3	4

CHILD'S QUESTIONNAIRE INSTRUCTIONS

General

- print your name
- age in years
- grade presently attending
- physical activity - running, jumping, playing games, relay races, swimming, skipping, playing catch, sports, physical education classes

Family Information

- read the question and look at the responses
- think of your father, answer using responses
- think of your mother, answer using responses
- participate with you - play catch with you, skip with you, play games with you, swim with you
-watch you - playing with friends, skipping, kicking a soccer ball, playing games or sports
- encourage you - do the say "go outside and play", "wouldn't you like to play with your friends", "why don't you try to do a forward roll"?
- say they wish you to be good - a good catcher, a good kicker, a good swimmer, a good soccer player, do they say "wouldn't you like to be good in sport" or "we wish that you were a good figure skater"?

Attitude

- looks at how you feel about taking part in physical activities, i.e., playing, games, sports, physical education classes
- no right or wrong answers - just how you feel
- be with your friends - do you like to play with your friends? do you like to play catch because you can be with your friends?
- healthy - makes you feel good, stronger, run faster
- scary or dangerous - makes you dizzy, hanging upside down, going fast on a merry-go-round, twirling really fast
- beautiful movements - graceful, flowing, rhythmical (to a beat), figure skating, dancing, ballet, gymnastics
- practicing - go to skating lessons instead of playing with your friends, go to soccer practice instead of watching television after school
- frustrated - do you run really fast to forget your problems? do you kick a ball as hard as you can and it makes you feel better? if you feel sad, does throwing a ball as far as you can make you feel better?
- competition - do you like to win? do you hate to lose? try your hardest to win? when running in a race, do you try your hardest to beat your friend?

Body Satisfaction

- list of body parts
- tell how you feel about different parts of your body
- are your happy with these body parts, or are you sad?
- do you like the way your body is, or do you dislike the way your body is?

Movement Satisfaction

- lists different movements
- tell me how you feel about the way you move
- the answers to choose from are like the section about your body
- running for speed - fast, quickly, rapid from one place to another
- jump for height - as high as you can, jump over things, leap-frog
- pick up and carry things without dropping them - carrying a box, two cans, pick up and run with a ball without dropping it
- balance on one leg - without falling over
- cartwheels and gymnastic stunts - stand on your head or hands, a forward roll
- catch a ball - do you find it easy to catch a ball?
- jump to ground from height - jump off chair, fence, or swing

- move without feeling clumsy - awkward
- running for distance - run for a long time without getting tired or sore
- move to music - clap with the beat, dance
- kick a ball for distance - kick it far
- skip over a rope - skipping, overhand, double dutch
- jump for distance - long jump, jumping over a puddle so you don't get wet
- catching a ball after clapping your hands - once, twice, three, or four times without dropping the ball

APPENDIX E

Motor Performance Test

MOTOR PERFORMANCE TEST ITEMS

Stork Balance

- the subject stands on one foot and places the sole of the other foot against the side of the supporting knee
- the hands are placed on the hips with the fingers facing forward
- three trials per leg
- discontinue timing after 20 seconds, or if planted foot moves from the original position, or if the free foot leaves the knee, or if the hands are removed from the hips, or if the balancing position cannot be adopted

Board Balance

- the subject stands on the balance board (keel down) on one leg
- three trials for each leg
- discontinue timing after 10 seconds, or if the standing leg is moved from the board, or if the sides of the board tilt to touch the floor, or if the free leg touches the floor, or if the correct position is not attained

Jump and Balance

- subject takes off with feet together and jumps over cord (knee height) to land and balance on one foot
- maintain balance on one foot for 5 seconds
- three trials for each leg
- stop watch if cord is displaced, or if take-off is not from both feet at the same time, or if the balancing position is not maintained

Catch off Wall

- standing 8 feet away from the wall, the subject throws the ball against the wall and catches it on the return without the ball bouncing on the floor or against the body
- 15 trials

Clap and Catch

- the subject throws the ball into the air with the preferred hand and catches the ball with two hands
- different types of catches - after no claps, after one clap, after two claps, after three claps, after four claps, and catch with the preferred hand only after four claps
- one trial at each type of catch

(Refer to Taylor, 1981)

MOTOR PERFORMANCE TEST

NAME ______________________________

AGE __________

SCHOOL ______________________________

PREFERRED HAND Right Left

CLASSIFICATION A U O

stork balance (20 sec.)	Right 1 2 3	Left 1 2 3
catch off wall (15 trials)	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15	
board balance I (10 sec.)	Right 1 2 3	Left 1 2 3
clap & catch (P/F)	both 1 2 3 4	Preferred 4
jump with one one foot landing (5 sec.)	Right 1 2 3	Left 1 2 3

APPENDIX F

CAHPER Fitness Performance Test

CAHPER FITNESS PERFORMANCE TEST ITEMS

<u>Flexed Arm Hang</u>

- reverse grip on the bar
- eyes at bar level
- arms fully bent
- hold the position as long as possible

<u>Shuttle Run</u>

- one block at starting line; two blocks 10 metres away
- from prone position, jump up and sprint to end to retrieve block
- bring block to starting line and exchange blocks, taking the new block to the original line
- exchange blocks again and sprint past the original starting line
- two trials

<u>One Minute Speed Sit-ups</u>

- knees bent, hands behind head, partner holding feet
- elbows to knees and head returns to floor

- perform as many as possible in one minute

Standing Long Jump

- stand behind starting line
- jump as far as possible, landing on the mat
- measure to the nearest cm (starting line to heel)

Fifty Metre Run

- modified to be run in the gymnasium
- run as fast as possible from starting line to the finish line

Endurance Run

- modified to be run in the gymnasium
- 7 and 9 year olds run 800 metres
- 11 year olds run 1600 metres
- to cover the distance in as short a time as possible, but walking is allowed

(Refer to Gauthier, et al., 1980)

CAHPER FITNESS PERFORMANCE TEST

NAME ______________________________

AGE ____________ (years)

SCHOOL ______________________________

GRADE ____________

CLASSIFICATION ______________________________

ITEM	TRIAL 1	TRIAL 2	BEST SCORE
flexed arm hang (sec.)			
shuttle run (sec.)			
sit-ups (#/min.)			
standing long jump (cm)			
50 m run (sec.)			
endurance run (min.:sec.) 800 m 1600 m			

APPENDIX G

Variable Codes and Explanations

VARIABLE CODES	EXPLANATIONS
AGE	Case age classification.
FATNESS	Case fatness classification.
PFAH	Physical fitness item: flexed arm hang. Total number of seconds.
PFSR	Shuttle run. Total number of seconds.
PFFM	Fifty meter run. Total number of seconds.
PFER	Endurance run. Total number of seconds.
PFSU	Sit ups. Total number in 60 seconds.
PFLJ	Long jump. total centimeters.
MNFIT	Mean physical fitness performance.
MPSBL	Motor performance item, short balance left leg. Average number of seconds.
MPSBR	Short balance, right leg.
MPBBL	Balance board, left leg.
MPBBR	Balance board, right leg.
MPJBL	Jump and balance, left leg.
MPJBR	Jump and balance, right leg.
MPCOW	Catch off wall. Total number of successful catches from 15 trials.
MPCAC	Clap and catch. Succession most difficult trial.
MNPERF	Mean motor performance.
BC	Body cathexis.

MS	Movement satisfaction.
CPPEWIF	Child's perception of parental encouragement, participation with father.
CPPEWAF	Father watches.
CPPEENF	Father encourages.
CPPEF	Child's perception of father's encouragement.
CPPEWGF	Father wishes daughter to be good.
CPPEWIM	With mother.
CPPEWAM	Mother watches.
CPPEENM	Mother encourages.
CPPEWGM	Mother wishes daughter to be good.
CPPEM	Child's perception of mother's encouragement.
CATPASE	Child's attitude toward physical activity as a social experience.
CATPAHF	Health and fitness.
CATPATR	Thrill and risk.
CATPACA	Catharsis.
CATPATA	Training.
CATPACO	Competition.
MATPASE	Mother's attitude toward physical activity as a social experience.
MATPAHF	Health and fitness.
MATPATR	Thrill and risk.
MATPAAE	Aesthetic.
MATPACA	Catharsis.
MATPATA	Training.
MATPACO	Competition.

MATDPASE	Mother's attitude toward physical activity as a social experience for daughter.
MATDPAHF	Health and fitness for daughter.
MATDPATR	Thrill and risk for daughter.
MATDPAAE	Aesthetic for daughter.
MATDPACA	Cathartic for daughter.
MATDPATA	Training for daughter.
MATDPACO	Competition for daughter.
FATPASE	Father's attitude toward physical activity as a social experience.
FATPAHF	Health and fitness.
FATPATR	Thrill and risk.
FATPAAE	Aesthetic.
FATPACA	Cathertic.
FATPATA	Training.
FATPACO	Competition.
FATDPASE	Father's attitude toward physical activity as a social experience for daughter.
FATDPAHF	Health and fitness for daughter.
FATDPATR	Thrill and risk for daughter.
FATDPAAE	Aesthetic for daughter.
FATDPACA	Catharsis for daughter.
FATDPATA	Training for daughter.
FATDPACO	Competition for daughter.

APPENDIX H

Descriptive Statistics

Table H1: Nine years with average (A), undesirable (U) and over fat (O) for interval variables.

VARIABLE	FAT	N	MEAN	STD DEV	VARIANCE
PFAH	A	14	6.16	4.98	24.81
	U	6	7.09	5.57	30.98
	O	12	4.03	3.45	11.88
PFSR	A	14	11.36	6.21	38.61
	U	6	9.86	7.66	58.74
	O	12	14.83	4.94	24.44
PFFM	A	14	10.76	5.86	34.37
	U	6	9.74	7.65	58.57
	O	12	14.95	1.53	2.35
PFER	A	14	105.72	146.74	21533.25
	U	6	197.83	153.59	23592.17
	O	12	284.92	169.19	28624.27
PFSU	A	11	32.73	7.35	54.02
	U	4	29.75	13.89	192.92
	O	11	24.00	11.41	130.20
PFLJ	A	14	97.00	65.31	4265.53
	U	6	88.17	68.91	4748.57
	O	12	115.17	40.49	1640.15
MPSBL	A	14	11.66	5.23	27.37
	U	6	12.75	7.01	49.14
	O	12	9.89	5.46	29.86
MPSBR	A	14	11.35	6.39	40.86
	U	6	13.68	7.45	55.63
	O	12	8.17	5.45	29.74
MPBBL	A	14	4.03	3.15	9.91
	U	6	3.30	3.08	9.47
	O	12	3.07	2.09	4.36
MPBBR	A	14	3.74	2.87	8.25
	U	6	3.50	3.73	13.93
	O	12	3.44	2.56	6.56

MPJBL	A	14	3.11	1.64	2.70
	U	6	2.22	2.51	6.28
	O	12	1.27	1.09	1.19
MPJBR	A	14	3.09	1.77	3.12
	U	6	2.83	2.29	5.28
	O	12	2.45	1.95	3.80
MPCOW	A	13	9.00	2.97	8.83
	U	5	7.60	5.46	29.80
	O	12	8.42	4.83	23.36
MATPASE	A	11	45.82	9.55	91.36
	U	4	49.00	6.63	44.00
	O	12	45.58	7.77	60.45
MATPAHF	A	12	50.83	6.48	41.97
	U	4	50.75	5.74	32.92
	O	12	47.50	8.63	74.45
MATPATR	A	11	37.00	8.11	65.80
	U	4	36.25	1.89	3.58
	O	12	38.33	12.94	167.52
MATPAAE	A	12	53.17	5.37	28.88
	U	4	53.75	1.71	2.92
	O	12	48.92	9.05	81.90
MATPACA	A	11	49.00	6.21	38.60
	U	4	50.25	1.89	3.58
	O	11	46.55	8.91	79.47
MATPATA	A	10	40.30	7.97	63.57
	U	4	35.00	5.35	28.67
	O	12	40.75	8.40	70.57
MATPACO	A	10	45.30	11.18	124.90
	U	4	36.00	3.27	10.67
	O	12	44.92	9.25	85.54
MATDPASE	A	10	51.40	5.79	33.60
	U	4	51.75	3.50	12.25
	O	12	46.67	8.17	66.79
MATDPAHF	A	10	52.40	4.88	23.82
	U	4	51.75	4.43	19.58
	O	11	47.18	8.78	77.16
MATDPATR	A	10	37.10	11.19	125.21
	U	4	38.75	3.77	14.25
	O	11	38.09	11.82	139.69
MATPAAE	A	10	51.50	6.57	43.17
	U	4	52.50	5.07	25.67

	O	12	47.25	9.38	88.02
MATDPACA	A	10	47.10	8.09	65.43
	U	4	51.00	3.92	15.33
	O	9	46.22	7.92	62.69
MATDPATA	A	10	38.50	8.64	74.72
	U	4	42.00	10.29	106.00
	O	9	39.44	13.50	182.28
MATDPACO	A	10	41.60	13.65	186.27
	U	4	47.00	6.22	38.67
	O	10	46.40	8.30	68.93
FATPASE	A	11	48.91	7.05	49.69
	U	2	40.50	10.61	112.50
	O	7	4.04	9.95	99.14
FATPAHF	A	11	48.82	7.78	60.56
	U	2	46.00	5.66	32.00
	O	7	47.14	9.46	89.48
FATPATR	A	11	43.09	13.15	172.89
	U	2	36.50	2.12	4.50
	O	7	45.57	8.85	78.29
FATPAAE	A	11	49.18	6.62	43.76
	U	2	45.00	7.07	50.00
	O	7	50.14	6.82	46.48
FATPACA	A	11	45.55	7.83	61.27
	U	2	36.50	4.95	24.50
	O	7	46.71	9.19	84.57
FATPATA	A	11	41.55	8.10	65.67
	U	2	39.50	9.19	84.50
	O	7	42.43	9.48	89.95
FATPACO	A	10	44.70	7.48	56.01
	U	2	42.00	9.89	98.00
	O	7	47.43	8.48	71.95
FATDPASE	A	11	48.45	6.25	39.07
	U	2	36.00	4.24	18.00
	O	7	47.86	7.05	49.81
FATDPAHF	A	11	48.91	8.65	74.89
	U	2	43.00	8.48	72.00
	O	7	49.14	7.71	59.48
FATDPATR	A	11	41.36	11.33	128.25
	U	2	22.50	14.85	220.50
	O	7	40.14	8.93	79.81

FATDPAAE	A	11	45.36	9.06	82.05
	U	2	52.50	4.95	24.50
	O	7	49.86	8.05	64.81
FATDPACA	A	11	46.18	7.17	51.36
	U	2	41.00	4.24	18.00
	O	7	46.43	9.71	94.29
FATDPATA	A	11	41.18	8.81	77.56
	U	2	42.50	14.85	220.50
	O	7	39.00	15.97	255.00
FATDPACO	A	10	44.20	8.61	74.18
	U	2	42.50	9.19	84.50
	O	7	48.57	7.11	50.62

Table H2: Seven, nine and eleven years of average (A) and above average (AA) fatness for interval variables.

VARIABLE	AGE	FAT	N	MEAN	STD DEV	VARIANCE
PFAH	7	A	14	4.20	3.99	15.94
		AA	4	5.39	5.31	28.15
	9	A	14	6.16	4.98	24.81
		AA	18	5.05	4.36	19.02
	11	A	16	8.67	7.43	55.16
		AA	11	6.91	4.68	21.88
PFSR	7	A	14	12.59	8.38	70.29
		AA	4	12.48	8.42	70.83
	9	A	14	11.36	6.21	38.61
		AA	18	13.17	6.24	38.90
	11	A	16	11.39	5.72	32.68
		AA	11	12.55	4.22	17.82
PFFM	7	A	14	9.59	8.72	76.09
		AA	4	16.52	1.46	2.13
	9	A	14	10.76	5.86	34.37
		AA	18	13.21	5.01	25.12
	11	A	16	10.94	5.51	30.41
		AA	11	11.96	4.09	16.77
PFER	7	A	14	193.86	178.66	31920.29
		AA	4	260.50	181.19	32830.33
	9	A	14	205.21	146.74	21533.26
		AA	18	255.89	165.06	27244.81
	11	A	16	457.06	285.23	81358.06
		AA	11	426.91	348.75	121626.89
PFSU	7	A	10	16.90	11.77	138.54
		AA	4	10.25	8.18	66.91
	9	A	11	32.73	7.35	54.02
		AA	15	25.53	11.89	141.27
	11	A	13	32.85	9.12	83.14
		AA	9	27.78	13.43	180.44
PFLJ	7	A	14	69.21	47.33	2240.49
		AA	4	109.25	27.51	756.92
	9	A	14	97.00	65.31	4265.54
		AA	18	106.17	51.28	2629.44
	11	A	16	108.56	57.87	3348.39
		AA	11	124.00	43.20	1866.40

MPSBL	7	A	14	8.76	6.48	41.98
		AA	4	9.50	4.31	18.64
	9	A	14	11.66	5.23	27.37
		AA	18	10.84	5.97	35.69
	11	A	16	14.00	5.66	32.05
		AA	11	13.75	5.89	34.69
MPSBR	7	A	14	9.62	6.21	38.61
		AA	4	9.45	3.97	15.79
	9	A	14	11.35	6.39	40.86
		AA	18	10.01	6.54	42.77
	11	A	16	13.18	6.73	45.24
		AA	11	12.58	5.35	28.65
MPBBL	7	A	14	2.66	2.12	4.49
		AA	4	3.43	2.13	4.54
	9	A	14	4.03	3.15	9.91
		AA	18	3.14	2.37	5.61
	11	A	16	5.57	2.41	5.79
		AA	11	4.53	2.59	6.72
MPBBR	7	A	14	1.84	1.38	1.92
		AA	4	1.70	0.91	0.82
	9	A	14	3.74	2.87	8.25
		AA	18	3.46	2.89	8.34
	11	A	16	5.13	3.11	9.64
		AA	11	4.65	2.58	6.68
MPJBL	7	A	14	0.66	0.91	0.83
		AA	4	1.85	1.39	1.95
	9	A	14	3.11	1.64	2.70
		AA	18	1.58	1.68	2.83
	11	A	16	2.85	2.12	4.50
		AA	11	2.85	1.81	3.28
MPJBR	7	A	14	1.19	1.37	1.87
		AA	4	2.75	2.60	6.78
	9	A	14	3.09	1.77	3.12
		AA	18	2.58	2.01	4.05
	11	A	16	2.98	1.97	3.89
		AA	11	3.18	1.85	3.43
MPCOW	7	A	11	0.73	1.27	1.61
		AA	4	2.00	4.00	16.00
	9	A	13	9.00	2.97	8.83
		AA	17	8.18	4.86	23.65
	11	A	15	11.00	3.46	12.00
		AA	10	12.30	1.63	2.68

MATPASE	7	A	13	49.69	7.77	60.39
		AA	4	46.25	6.39	40.92
	9	A	11	45.82	9.56	91.36
		AA	16	46.44	7.45	55.46
	11	A	11	49.09	7.12	50.69
		AA	7	49.57	6.73	45.29
MATPAHF	7	A	13	50.46	7.01	49.10
		AA	4	47.00	8.25	68.00
	9	A	12	50.83	6.48	41.97
		AA	16	48.31	7.96	63.29
	11	A	12	49.83	7.13	50.87
		AA	7	51.71	6.24	38.90
MATPATR	7	A	13	36.46	13.53	182.94
		AA	4	34.25	8.46	71.58
	9	A	11	37.00	8.11	65.80
		AA	16	37.81	11.15	124.43
	11	A	12	43.75	11.42	130.39
		AA	7	41.29	6.99	48.90
MATPAAE	7	A	13	53.15	5.29	27.97
		AA	4	47.25	11.05	122.25
	9	A	12	53.17	5.37	28.88
		AA	16	50.13	8.08	65.32
	11	A	12	51.67	5.73	32.79
		AA	7	53.00	4.32	18.67
MATPACA	7	A	13	46.15	11.81	139.47
		AA	4	46.00	9.63	92.67
	9	A	11	49.00	6.21	38.60
		AA	15	47.53	7.77	60.41
	11	A	12	46.00	10.37	107.64
		AA	7	52.71	4.64	21.57
MATPATA	7	A	13	42.77	9.79	96.03
		AA	4	32.25	5.25	27.58
	9	A	10	40.30	7.97	63.57
		AA	16	39.31	8.01	64.09
	11	A	12	45.58	7.70	59.36
		AA	7	42.14	3.80	14.48
MATPACO	7	A	13	47.46	8.74	76.44
		AA	4	43.00	9.69	94.00
	9	A	10	45.30	11.18	124.90
		AA	16	42.69	8.97	80.76
	11	A	12	47.33	6.49	42.06
		AA	7	48.86	7.17	51.48

MATDPASE	7	A	13	51.77	6.66	44.35
		AA	4	45.75	11.32	128.25
	9	A	10	51.40	5.79	33.60
		AA	16	47.94	7.52	56.59
	11	A	11	51.64	4.46	19.85
		AA	7	52.86	5.67	32.14
MATDPAHF	7	A	13	51.54	7.85	61.60
		AA	4	45.75	10.21	104.25
	9	A	10	52.40	4.88	23.82
		AA	15	48.40	7.98	63.69
	11	A	12	49.67	6.09	37.15
		AA	7	53.57	2.82	7.95
MATDPATR	7	A	13	36.00	12.69	161.17
		AA	4	37.00	3.92	15.33
	9	A	10	37.10	11.19	125.21
		AA	15	38.26	10.15	102.92
	11	A	12	36.83	13.49	181.97
		AA	7	38.29	6.37	40.57
MATDPAAE	7	A	13	52.46	7.21	52.10
		AA	4	48.75	10.87	118.25
	9	A	10	51.50	6.57	43.17
		AA	16	48.56	8.67	75.19
	11	A	12	51.42	4.66	21.72
		AA	7	53.43	3.55	12.62
MATDPACA	7	A	13	47.23	8.29	68.86
		AA	4	38.50	13.79	190.33
	9	A	10	47.10	8.09	65.43
		AA	13	47.69	7.13	50.89
	11	A	12	47.50	7.82	61.18
		AA	7	52.71	3.04	9.24
MATDPATA	7	A	13	45.23	7.97	63.53
		AA	4	35.50	2.52	6.33
	9	A	10	38.50	8.64	74.72
		AA	13	40.23	12.23	149.53
	11	A	12	41.58	12.86	165.36
		AA	6	48.00	3.89	15.20
MATDPACO	7	A	13	45.77	9.77	95.53
		AA	4	44.50	7.33	53.67
	9	A	10	41.60	13.65	186.27
		AA	14	46.57	7.53	56.73
	11	A	12	47.25	7.39	54.57
		AA	7	47.14	8.28	68.48

FATPASE	7	A	4	49.75	5.85	34.25
		AA	3	48.00	7.00	49.00
	9	A	11	48.91	7.05	49.69
		AA	9	41.00	9.41	88.50
	11	A	9	46.56	6.13	37.53
		AA	3	42.00	4.36	19.00
FATPAHF	7	A	3	51.00	6.25	39.00
		AA	3	51.67	7.51	56.33
	9	A	11	48.82	7.78	60.56
		AA	9	46.89	8.45	71.36
	11	A	9	51.44	5.15	26.53
		AA	3	51.33	7.23	52.33
FATPATR	7	A	3	47.00	7.94	63.00
		AA	3	46.00	8.72	76.00
	9	A	11	43.09	13.15	172.89
		AA	9	43.56	8.68	75.28
	11	A	9	44.67	8.00	64.00
		AA	3	44.67	4.62	21.33
FATPAAE	7	A	4	48.25	1.26	1.58
		AA	3	51.33	8.08	65.33
	9	A	11	49.18	6.62	43.76
		AA	9	49.00	6.80	46.25
	11	A	9	47.56	7.84	61.53
		AA	3	45.67	2.52	6.33
FATPACA	7	A	4	44.75	9.91	98.25
		AA	3	51.67	7.51	56.33
	9	A	11	45.55	7.83	61.27
		AA	9	44.44	9.32	86.78
	11	A	9	43.44	12.46	155.28
		AA	3	46.67	4.93	24.33
FATPATA	7	A	4	42.00	2.31	5.33
		AA	3	48.67	12.70	161.33
	9	A	11	41.55	8.10	65.67
		AA	9	41.78	8.93	79.69
	11	A	9	38.89	4.70	22.11
		AA	3	43.67	4.51	20.33
FATPACO	7	A	4	50.25	6.65	44.25
		AA	3	50.00	10.39	108.00
	9	A	10	44.70	7.48	56.01
		AA	9	46.22	8.48	71.94
	11	A	9	43.56	5.89	34.78
		AA	3	44.00	8.89	79.00
FATDPASE	7	A	4	52.25	4.35	18.91
		AA	3	50.00	10.39	108.00
	9	A	11	48.45	6.25	39.07
		AA	9	45.22	8.18	66.94
	11	A	9	45.56	5.32	28.28

		AA	3	46.33	8.39	70.33
FATDPAHF	7	A	4	51.75	4.35	18.91
		AA	3	50.00	10.39	108.00
	9	A	11	48.91	8.65	74.89
		AA	9	47.78	7.81	60.94
	11	A	9	49.56	3.84	14.78
		AA	3	51.67	4.51	20.33
FATDPATR	7	A	4	33.00	11.65	135.33
		AA	3	45.67	10.50	110.33
	9	A	11	41.36	11.33	128.25
		AA	9	36.22	12.16	147.94
	11	A	9	41.44	8.23	67.78
		AA	2	44.00	4.24	18.00
FATDPAAE	7	A	4	54.25	2.87	8.25
		AA	3	49.33	11.55	133.33
	9	A	11	45.36	9.06	82.05
		AA	9	50.44	7.28	53.03
	11	A	9	48.78	6.46	41.69
		AA	3	48.67	7.51	56.33
FATDPACA	7	A	4	43.75	8.66	74.92
		AA	3	48.33	7.51	56.33
	9	A	11	46.18	7.17	51.36
		AA	9	45.22	8.87	78.69
	11	A	9	47.78	4.49	20.19
		AA	3	42.33	4.93	24.33
FATDPATA	7	A	4	40.00	6.58	43.33
		AA	3	50.67	9.24	85.33
	9	A	11	41.18	8.81	77.56
		AA	9	39.78	14.87	221.19
	11	A	9	35.33	11.87	141.00
		AA	2	27.00	7.07	50.00
FATDPACO	7	A	4	50.25	7.23	52.25
		AA	3	49.67	10.97	120.33
	9	A	10	44.20	8.61	74.18
		AA	9	47.22	7.46	55.69
	11	A	9	46.00	6.46	41.75
		AA	3	38.33	12.42	154.33

Table H3: Seven years at average (N=14) and above average (N=4) fatness for ordinal variables.

VARIABLE	FAT	RANGE MIN.	MAX.	MODE	MEDIAN
MPCAC	A	0	4	0	0.42
	AA	0	5	2	2.00
BC	A	22	48	33	35.50
	AA	33	48	33	36.50
MS	A	36	56	40	43.00
	AA	51	56	51	51.83
CPPEWIF	A	0	3	1	1.83
	AA	0	2	2	1.50
CPPEWAF	A	0	3	2	1.70
	AA	1	3	3	2.50
CPPEENF	A	0	3	2	2.00
	AA	2	3	3	2.83
CPPEWGF	A	0	3	0	1.17
	AA	1	3	3	2.50
CPPEWIM	A	0	2	2	1.90
	AA	1	2	2	1.83
CPPEWAM	A	0	3	2	1.93
	AA	1	2	2	1.83
CPPEENM	A	0	3	3	2.25
	AA	2	3	2	2.17
CPPEWGM	A	0	2	0	0.83
	AA	1	3	2	2.00
CATPASE	A	3	4	4	3.90
	AA	0	4	4	4.00
CATPAHF	A	3	4	4	3.90
	AA	3	4	4	3.83
CATPATR	A	1	3	1	2.00
	AA	0	2	2	2.00
CATPAAE	A	3	4	4	3.90
	AA	3	4	4	3.83

CATPACA	A	1	4	4	3.17
	AA	2	4	4	3.50
CATPATA	A	1	4	4	2.83
	AA	3	4	3	3.50
CATPACO	A	2	4	4	3.83
	AA	3	4	4	3.83

Table H4: Nine years at average (N=14, undesirable (N=6) and over fat (N=12) for ordinal variables.

VARIABLE	FAT	RANGE MIN.	MAX.	MODE	MEDIAN
MPCAC	A	3	6	4	4.00
	U	2	5	5	4.67
	O	2	6	3	3.50
BC	A	28	41	35	35.00
	U	28	36	28	34.00
	O	21	44	33	32.50
MS	A	40	55	42	46.25
	U	27	47	27	44.00
	O	31	56	31	47.50
CPPEWIF	A	0	3	0	1.63
	U	2	3	2	2.33
	O	0	3	2	1.70
CPPEWAF	A	0	3	2	1.92
	U	1	3	3	2.67
	O	0	3	2	2.00
CPPEENF	A	0	3	3	1.75
	U	1	3	3	2.67
	O	0	3	3	1.50
CPPEWGF	A	0	3	2	1.92
	U	1	3	1	2.00
	O	0	3	0	1.00
CPPEWIM	A	0	3	2	2.00
	U	0	2	2	1.67
	O	0	3	2	1.94
CPPEWAM	A	0	3	2	1.88
	U	1	3	2	2.00
	O	1	3	2	2.21
CPPEENM	A	0	3	3	2.13
	U	1	3	1	2.00
	O	0	3	3	2.50
CPPEWGM	A	1	3	2	2.42
	U	1	3	3	2.33
	O	0	3	2	1.75

CATPASE	A	2	4	4	3.57
	U	2	4	3	3.00
	O	2	4	4	3.50
CATPAHF	A	2	4	3	3.42
	U	3	4	4	3.67
	O	3	4	4	3.64
CATPATR	A	1	4	2	2.00
	U	1	3	1	1.75
	O	1	4	2	2.14
CATPAAE	A	1	4	3	3.29
	U	2	4	3	3.00
	O	2	4	3	3.30
CATPACA	A	1	4	3	2.86
	U	1	4	3	3.00
	O	2	4	3	3.33
CATPATA	A	1	4	3	2.60
	U	2	4	2	2.75
	O	1	4	3	2.83
CATPACO	A	3	4	4	3.91
	U	1	4	4	3.67
	O	2	4	4	3.75

Table H5: Eleven years at average (A) and above average (AA) fatness for ordinal variables.

VARIABLE	FAT	RANGE MIN.	RANGE MAX.	MODE	MEDIAN
MPCAC	A	2	6	6	4.67
	AA	3	6	4	4.50
BC	A	26	48	31	34.75
	AA	14	39	30	32.25
MS	A	32	56	42	48.00
	AA	20	56	42	44.50
CPPEWIF	A	0	3	3	2.42
	AA	0	3	3	2.33
CPPEWAF	A	0	3	2	2.19
	AA	0	3	2	1.88
CPPEENF	A	1	3	2	2.31
	AA	0	3	3	2.58
CPPEWGF	A	0	3	2	2.00
	AA	0	3	2	2.00
CPPEWIM	A	0	3	2	2.29
	AA	1	3	2	2.08
CPPEWAM	A	0	3	3	2.56
	AA	1	3	2	2.40
CPPEENM	A	1	3	2	2.43
	AA	2	3	3	2.95
CPPEWGM	A	0	3	2	2.14
	AA	1	3	2	2.25
CATPASE	A	1	4	3	3.43
	AA	1	4	3	2.92
CATPAHF	A	3	4	3	3.44
	AA	3	4	3	3.29
CATPATR	A	1	4	3	2.86
	AA	1	4	2	2.13
CATAAE	A	3	4	4	3.75
	AA	1	4	3	2.88

CATPACA	A	1	4	3	3.06
	AA	1	3	2	2.25
CATPATA	A	1	4	4	2.88
	AA	1	4	3	2.80
CATPACO	A	3	4	4	3.92
	AA	3	4	4	3.58

APPENDIX I

Correlation Among Parental Attitudes

TABLE I1: Significant Pearson product-moment correlation coefficients - Mothers' then Fathers' attitude toward daughter's physical activity (7 years, average fat).

VARIABLE	VARIABLE	COEFFICIENT	CASES	SIGNIFICANCE
MATDPASE	MATDPAHF	.892	13	.000
	MATDPAAE	.969	13	.000
	MATDPACA	.553	13	.025
	MATDPATA	.729	13	.002
	MATDPACO	.708	13	.003
MATDPAHF	MATDPATR	.509	13	.038
	MATDPAAE	.913	13	.000
	MATDPACA	.546	13	.027
	MATDPATA	.771	13	.001
	MATDPACO	.673	13	.006
MATDPATR	MATDPAAE	.469	13	.053
	MATDPACA	.671	13	.006
MATDPAAE	MATDPACA	.538	13	.029
	MATDPATA	.688	13	.005
	MATDPACO	.651	13	.008
MATDPACA	MATDPATA	.479	13	.049
	MATDPACO	.569	13	.021
MATDPATA	MATDPACO	.936	13	.000
FATDPASE	FATDPAHF	.991	4	.004
FATDPAHF	FATDPACO	.915	4	.043

TABLE I2: Significant Pearson product moment correlation coefficient - fathers' compared to mothers' attitude toward daughter's physical activity (7 years, average fat).

VARIABLE	VARIABLE	COEFFICIENT	CASES	SIGNIFICANCE
FATDPATR	MATDPAHF	.917	4	.042
	MATDPAAE	.917	4	.042
FATDPACO	MATDPASE	.978	4	.011
	MATDPATR	.990	4	.005
	MATDPACA	.969	4	.016
	MATDPATA	.967	4	.017
	MATDPACO	.960	4	.020

TABLE I3: Significant Pearson product-moment correlation coefficients - physical performance and parents' attitude toward daughter's physical activity (7 years, average fat).

VARIABLE	VARIABLE	COEFFICIENT	CASES	SIGNIFICANCE
MNFIT	FATDPACA	-.909	4	.045
MNMOT	FATPATR	-.992	3	.039
	FATDPATA	.926	4	.037

TABLE I4: Significant Pearson product-moment correlation coefficients - mothers' and fathers' attitude toward daughter's physical activity then COMPARED (7 years, above average fat).

VARIABLE	VARIABLE	COEFFICIENT	CASES	SIGNIFICANCE
MATDPASE	MATDPAHF	.959	4	.020
	MATDPAAE	.933	4	.033
MATDPAHF	MATDPAAE	.963	4	.019
FATDPASE	FATDPAHF	1.0	3	.000
	FATDPAAE	1.0	3	.000
	FATDPATA	1.0	3	.000
	FATDPACO	1.0	3	.000
FATDPAHF	FATDPAAE	1.0	3	.000
	FATDPATA	1.0	3	.000
	FATDPACO	1.0	3	.000
FATDPATR	FATDPACA	.998	3	.021
FATDPAAE	FATDPATA	1.0	3	.000
	FATDPACO	1.0	3	.000
FATDPATA	FATDPACO	1.0	3	.000
FATDPACA	MATDPACA	-.995	3	.033

TABLE I5: Significant Pearson product-moment correlation coefficients - physical performance and parents' attitude toward daughter's physical activity (7 years, above average fat).

VARIABLE	VARIABLE	COEFFICIENT	CASES	SIGNIFICANCE
MNFIT	FATPATR	.993	3	.038
MNMOT	MATDPATA	.986	4	.007

TABLE I6: Significant Pearson product-moment correlation coefficients - mothers' and fathers' attitude toward daughter's physical activity (9 years, above average fat).

VARIABLE	VARIABLE	COEFFICIENT	CASES	SIGNIFICANCE
MATDPATR	MATDPACO	-.607	10	.031
FATDPASE	FATDPAHF	.835	11	.001
	FATDPAAE	.795	11	.002
	FATDPACA	.712	11	.007
FATDPAHF	FATDPAAE	.862	11	.000
	FATDPACA	.678	11	.011
	FATDPACO	.646	10	.022
FATDPATR	FATDPACA	.737	11	.005
FATDPAAE	FATDPACA	.743	11	.004
	FATDPATA	.617	11	.022
	FATDPACO	.564	10	.045
FATDPACA	FATDPATA	.557	11	.038
	FATDPACO	.672	10	.017
FATDPATA	FATDPACO	.746	10	.007

TABLE I7: Significant Pearson product-moment correlation coefficients - father's compared to mothers' attitude toward daughter's physical activity and physical performance (9 years, average fat).

VARIABLE	VARIABLE	COEFFICIENT	CASES	SIGNIFICANCE
FATDPASE	MATDPAAE	.698	9	.018
	MATDPACO	-.599	9	.044
FATDPAHF	MATDPAAE	.733	9	.012
FATDPATR	MATDPAAE	.836	9	.002
FATDPAAE	MATDPAAE	.681	9	.022
FATDPACA	MATDPAAE	.885	9	.001
FATDPATA	MATDPACA	.616	9	.039
FATDPACO	MATDPATR	-.802	8	.008
	MATDPAAE	.917	8	.001
MNFIT	FATDPATR	.739	11	.005
	MATPASE	.574	11	.032
	MATPAHF	.640	12	.012
	FATPATR	.599	11	.026
MNMOT	FATDPATR	.719	11	.006
	FATPATR	.608	11	.024

TABLE I8: Significant Pearson product-moment correlation coefficients - mothers' and fathers' attitude toward daughters' physical acticity (9 years, above average fat).

VARIABLE	VARIABLE	COEFFICIENT	CASES	SIGNIFICANCE
MATDPASE	MATDPAHF	.814	15	.000
	MATDPAAE	.803	16	.000
	MATDPACA	.758	13	.001
	MATDPACO	.783	14	.000
MATDPAHF	MATDPAAE	.886	15	.000
	MATDPACA	.771	13	.001
	MATDPACO	.755	14	.001
MATDPAAE	MATDPACA	.807	13	.001
	MATDPACO	.624	14	.009
MATDPACA	MATDPATA	.464	13	.055
	MATDPACO	.707	13	.003
FATDPASE	FATDPAHF	.897	9	.001
	FATDPAAE	.611	9	.040
	FATDPACA	.589	9	.047
	FATDPACO	.628	9	.035
FATDPAHF	FATDPAAE	.833	9	.019
	FATDPACA	.694	9	.019
	FATDPACO	.696	9	.019
FATDPAAE	FATDPACA	.662	9	.026
FATDPACA	FATDPATA	.687	9	.020

TABLE 19: Significant Pearson product-moment correlation coefficients - fathers' compared to mothers' attitude toward daughter's physical activity and physical performance (9 years, above average fat).

VARIABLE	VARIABLE	COEFFICIENT	CASES	SIGNIFICANCE
FATDPASE	MATDPATA	-.790	7	.017
FATDPAAE	MATDPACA	.694	7	.042
	MATDPACO	-.650	8	.040
FATDPATA	MATDPATA	-.677	7	.047
MNFIT	MATDPACA	-.392	13	.093
	FATDPASE	-.671	9	.024
	FATDPAHF	-.596	9	.045
	FATDPATR	-.649	9	.029
	FATDPACA	-.642	9	.031
	FATDPACO	-.740	9	.011
	MATPATA	-.3798	16	.073
	FATPATR	-.564	9	.057
	FATPAAE	-.639	9	.032
	FATPACA	-.539	9	.067
	FATPATA	-.477	9	.097
	FATPACO	-.549	9	.063
MNMOT	MATDPACO	-.435	14	.060
	FATDPATA	.5605	9	.058
	FATDPACO	.483	9	.094
	FATPASE	.482	9	.095

TABLE I10: Significant Pearson product-moment correlation coefficients - mothers' and father's attitude toward daughter's physical activity (11 years, average fat).

VARIABLE	VARIABLE	COEFFICIENT	CASES	SIGNIFICANCE
MATDPASE	MATDPAHF	.956	11	.000
	MATDPAAE	.888	11	.000
	MATDPACA	.605	11	.024
	MATDPATA	.753	11	.004
	MATDPACO	.975	11	.000
MATDPAHF	MATDPAAE	.719	12	.004
	MATDPACA	.538	12	.036
	MATDPATA	.563	12	.028
	MATDPACO	.955	12	.000
MATDPAAE	MATDPACA	.567	12	.027
	MATDPATA	.713	12	.005
	MATDPACO	.841	12	.000
MATDPACA	MATDPACO	.577	12	.025
MATDPATA	MATDPACO	.595	12	.021
FATPPASE	FATDPAHF	.680	9	.022
	FATDPATR	.662	9	.026
	FATDPATA	.838	9	.002
	FATDPACO	.669	9	.024
FATDPAHF	FATDPATR	.923	9	.000
	FATDPACA	.703	9	.017
	FATDPACO	.765	9	.008
FATDPATR	FATDPACA	.811	9	.004
	FATDPACO	.818	9	.004
FATDPACA	FATDPACO	.715	9	.015
FATDPATA	FATDPACO	.608	9	.041

TABLE I11: Significant Pearson product-moment correlation coefficients - fathers' compared to mothers' attitude toward daughter's physical activity and physical performance (11 years, average fat).

VARIABLE	VARIABLE	COEFFICIENT	CASES	SIGNIFICANCE
FATDPASE	MATDPASE	.738	8	.018
	MATDPAHF	.585	9	.049
	MATDPAAE	.656	9	.028
	MATDPATA	.792	9	.005
	MATDPACO	.591	9	.047
FATDPAHF	MATDPASE	.762	8	.014
	MATDPAHF	.834	9	.003
	MATDPATA	.647	9	.030
	MATDPACO	.789	9	.006
FATDPATR	MATDPASE	.824	8	.006
	MATDPAHF	.866	9	.001
	MATDPAAE	.617	9	.039
	MATDPACO	.836	9	.002
FATDPAAE	MATDPAAE	.645	9	.030
	MATDPATA	.674	9	.023
FATDPACA	MATDPAHF	.592	9	.047
FATDPATA	MATDPATA	.771	9	.008
FADPACO	MATDPAHF	.732	9	.012
	MATDPACO	.591	9	.047
MNMOT	FATPAHF	-.637	9	.033

TABLE I12: Significant Pearson product-moment correlation coefficients - parents' attitude toward daughter's physical acticities, compared, and physical performance (11 years, above average fat).

VARIABLE	VARIABLE	COEFFICIENT	CASES	SIGNIFICANCE
MATDPASE	MATDPAHF	.767	7	.022
	MATDPAAE	.873	7	.005
	MATDPATA	.801	6	.028
MATDPAHF	MATDPAAE	.969	7	.000
	MATDPACA	.683	7	.045
MATDPATR	MATDPACA	-.709	7	.037
FATDPAHF	FATDPAAE	.999	3	.008
FATDPACO	MATDPASE	.999	3	.006
	MATDPAHF	.993	3	.037
	MATDPAAE	.999	3	.013
MNFIT	FATDPACO	.989	3	.048
	MATPASE	.729	7	.032
	MATPAHF	.801	7	.015
	MATPACA	.765	7	.023
	MATDPASE	.920	7	.002
	MATDPAAE	.697	7	.041
	MATDPATA	.829	6	.021
MNMOT	MATDPASE	-.667	7	.051
	MATDPACO	-.767	7	.022
	FATPACO	-.995	3	.033